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The Inventive age and  
industrial review

# The Inventive Age

## AND INDUSTRIAL REVIEW

A JOURNAL OF MANUFACTURING INDUSTRY  
AND SCIENTIFIC PROGRESS

Ninth Year.  
No. 2.

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### NEEDED REFORM IN PATENT LAWS.

#### Consensus of Opinion Received by the Committee on Patents of the American Association of Manufacturers.

The queries set forth in a special circular sent out to patent attorneys and others by the committee on patents of the National Association of Manufacturers, have brought a large number of replies and suggestions as to needed reforms in patent laws. The committee compiled and classified this great mass of correspondence and issued (Circular No. 20,) a little pamphlet of 20 pages. We quote at some length the various opinions expressed and conclusions reached:

#### ANNUITIES ON UNITED STATES PATENTS.

It was not intended to suggest that annuities in United States patents should be retroactive, but that they should apply to patents from the time a new law might be passed or take effect.

If recommended, the recommendation would probably take something of the idea in use in the Canadian Patent Office, viz., that the patent be granted for a term of six or seven years with privilege of a second and third term of five or six years, by payment of an additional sum before the expiration of first term for the second and third terms, or before the end of the first term for the second term, and before the end of the second term for the third term, the government fee to be proportioned to the length of the terms.

This, it was thought, would make the first cost of the patent less, thereby saving something to the patentee if he did not desire a further term; would cost him no more in any case; would give him an opportunity to ascertain the value of his invention, and if he should not consider it of sufficient value to extend the term, would enable him to abandon it to the public.

Would this in any way be detrimental to the patentee, and would it not be beneficial to the coming inventor to have removed from his path all such patents as the patentee did not consider worthy of renewal? If this method should succeed in lessening the number of patents in force, would not the poor inventor stand a better chance of securing use of his patent from the fact of less liability of infringement and the lessened cost of searching the records as regards state of the art?

Would the suggestion of a compulsory license on patents which are not being worked be beneficial?

The committee has decided that the question of trade-marks and copyrights shall be taken up by a separate committee.

In the correspondence received by the committee 60 per cent of the attorneys, and 66 per cent of the manufacturers were in favor of some form of annuity.

Extracts from a few of the letters (name of author omitted) in relation to this subject received by the

committee are given below:

It is certainly desirable in our opinion that some means be devised whereby the large number of outstanding useless patents can be put out of the way of subsequent inventions; but an annuity tax on United States inventors, who are generally poor, would frequently result in depriving a meritorious inventor of all benefits of his invention, and would tend to retard the advance of the arts by deterring and discouraging such inventors from patenting or making public their efforts.

\* \* \*

I have always favored the charge of a small annuity on patents. The experience of Belgium shows that this requirement eliminates about 90 per cent of the patents granted in five years and thus gets rid of worthless trash that otherwise is an impediment in the path of improvement.

\* \* \*

An annuity or tax by the Government on patents is not desirable. Many patentees, while possessing the brains, unfortunately do not possess the means to put their inventions into marketable use. Nevertheless, if the invention is necessary to the public, or contains elements required by others to advance their ideas, then the public or others having the means should pay and the patentee should receive due compensation. The poorer he is the more he is to be commended, and his efforts should be appreciated. It is the inventor's privilege to keep within himself and deprive mankind of the result of his genius, or, by agreement with the Government divulge to the public for its free and unrestricted use after a period of seventeen years the efforts of his brain, and in many cases the result of years

(Continued on page 20.)



HON. CHARLES H. DUELL, COMMISSIONER OF PATENTS.

### The New Commissioner of Patents.

The recent appointment of the Hon. Charles H. Duell as Commissioner of Patents, is an act of wisdom that will be heartily approved by all those who are interested in the honest and able conduct of patent office affairs, and by all who believe in "good government."

There are few things, if any, which concern so nearly the interest of a people, as those that pertain to the products of its inventors; and for the welfare of the latter valuable class of citizens, it is absolutely necessary that the first results of their labors (their inventions) should be looked after by men of ability and integrity. These characteristics and more were found abundantly in the late Benjamin Butterworth; and it is safe to say that no one, except the "patent shark," will be disappointed in the worthy successor of the departed commissioner.

For performing the duties that belong to the head of the patent office, it is necessary that the incumbent be a good patent lawyer; and according to the fitness of things this qualification is eminently possessed by Mr. Duell. He was also, at one time assistant examiner in the patent office, holding this position until 1880, when he moved to Syracuse, N. Y., and began the practice of his profession. For eighteen years his work has ranged over a wide field of practice, and he has been highly successful. Many cases of great importance have received his attention, not a few of which being litigations, a branch of patent practice to which Mr. Duell has given especial attention.

Although, with the great possibilities of the American citizen, the occurrence of a son occupying the high official position once held by his father, seldom happens; yet this is the case with the new commissioner.

Mr. Duell's father, R. Hollaud Duell, after serving four terms in Congress, was appointed commissioner of patents, beginning his work in this capacity Oct. 1, 1875. Here father and son worked together in the same interest (for the benefit of the inventor), the former quitting his official place in January 1877; the latter leaving when he began, in a wider field for his talent, to make available the knowledge gained by practical experience.

Mr. C. H. Duell, was born at Cortland, N. Y., in 1850. He received his preliminary education in the Cortland Normal School; after which he entered Hamilton College, graduating from that place in 1871. He was honor man in his class and carried off several prizes.

It may be stated here that the reforms in the patent office brought about by his predecessor are endorsed by Mr. Duell. The office will be conducted upon strictly business principles; and work will be expected as much as circumstances will permit.

A Madrid dispatch states that the cost to Spain of the Cuban war from February, 1895, to the end of 1897 is officially estimated at \$240,000,000, besides the arrears due from the Cuban treasury, which amount to \$40,000,000.



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WASHINGTON—NEW YORK, FEB. 1898.

THE dispatches tell us of the suicide of a San Francisco inventor because his air ship didn't fly, and the New York Press cruelly suggests that he would have been saved the trouble if he had continued in his experiments.

THE inventive genius finds the Alaskan field a good one just now. The latest is metal huts or shanties said to be proof against rain, snow, frost or fire. They are extremely light and commodious and easily put in position.

By a recent decision handed down by the United States Circuit Court for the Southern division, New York, the Van Depoele trolley patent was sustained. The Walker Company will appeal and contest the case vigorously.

THERE being a complete set of patent office reports in the Chicago Public Library, patent attorneys and others interested in patent matters in Chicago are making an effort to have this department of the institution remain open until 9 o'clock evenings.

MR. L. S. BACON, the new secretary of the Patent Law Association, is a gentleman in every way qualified to perform the duties of this important position. He is one of the leading practitioners before the patent office and a gentleman of character and standing in the profession.

AT the last meeting of the Patent Law Association the following new members were admitted: Edward Wilhelm, of Buffalo, N. Y.; Henry W. Williams, of Boston, Mass.; Edward Corpmael, of London, Eng.; Jules Geraud, of Rio Janeiro, Brazil; and Paul Leclere, of Rio Janeiro, Brazil.

THE attention of our readers is specially called to the first of a series of articles on "The Steam Engine," by L. N. Gillis, appearing in this issue. These articles will deal with the various devices for the generating of steam and its use as a motive power from the earliest inventions and discoveries down to the present day and will be found of unusual interest to engineers and mechanics.

THE House Committee on Patents having reported favorably on the three bills prepared by Assistant Commissioner Greeley, it is hoped congress will take early and favorable action and that these meritorious measures may soon be enacted into laws. No. 6349 relates to the recognition of agents and attorneys appearing before the patent office; No. 6650 amends certain sections of the Revised Statutes, to relieve the office of the commissioner of patents and No. 7082 provides for the establishment of a classification division in the U. S. patent office. With a

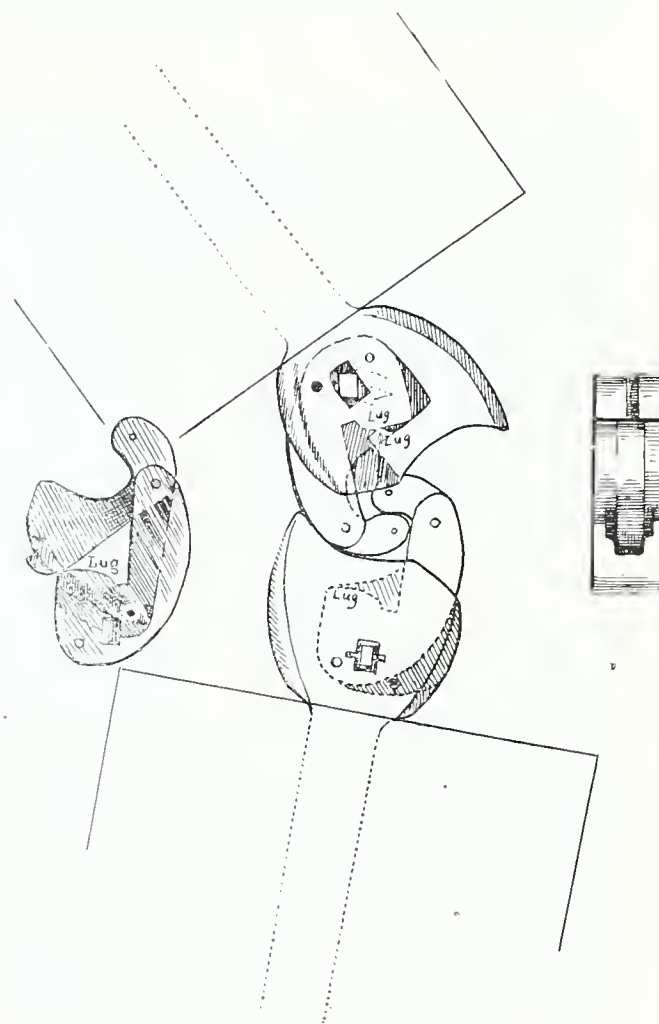
large and increasing surplus in the treasury to the credit of the patent office there exists no good reason for delay in legislation calculated to improve the efficiency of the patent office work.

## The Dinsmore Automatic Car Coupler.

The recent extension of time (to Jan. 1900) set by the Congressional act of March 2d, 1893, requiring railroads to equip their cars with safety coupling appliances, is considered by those who understand the matter, as being a wise decision of the Interstate Commerce Commission. This gives ample time to railroad corporations to examine, test and select the best couplers suited to their needs; to the inventor, who may desire to originate or perfect coupling apparatus, or to bring the product of his inventive genius to the attention of those whom it may most benefit.

The records of the Patent Office show an enormous number of patents for car couplers. But out of this lavish outlay of inventive skill (?) there are few—very few—that to any great extent meet the requirements of a perfect automatic coupler. This should be simple, easily operated practically indestructible and not expensive. In this category we might mention the Dinsmore Coupler, which no doubt will play an important part in future railroading.

The Dinsmore automatic coupler aims to fill all the requirements of the act of March 2d, 1893 in as simple, complete, inexpensive, and strong a form as possible. Its chief distinctive feature is the swinging arm, a very simple at the same time a very effective device. There are no complicated parts to get out of order or to break. It was designed by a practical railroad engineer of eighteen years experience to overcome all objectionable fea-



THE DINSMORE COUPLES ON A CURVE.

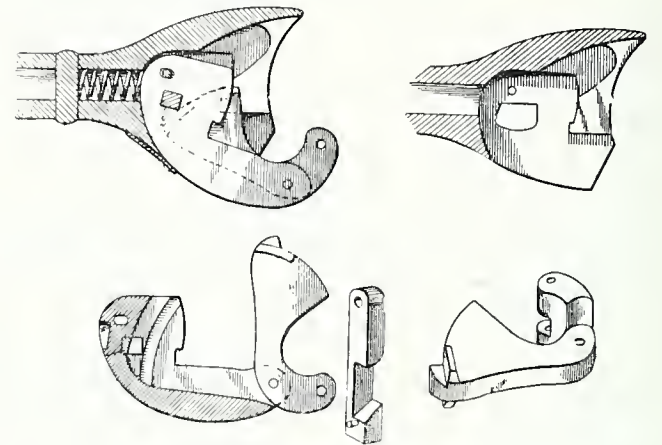
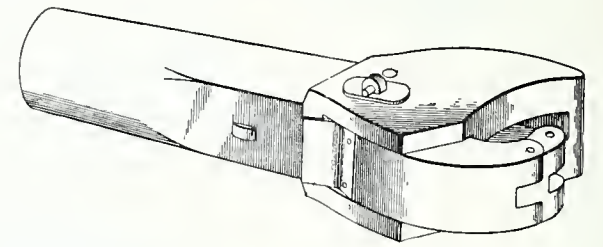
tures of existing car couplers, as demonstrated by every day wear and tear. The leading features may be categorically stated as follows:

- It couples under all conditions automatically.
- It couples on a curve
- It couples with knuckle closed and locked.
- It can be released without going between the cars.
- It can be released when train is under full tension.
- It can be released from side, platform or top of car, as desired.
- It will release itself if car upsets.
- It adjusts itself to any curve without strain on drawhead.
- It is fully operative if knuckle-pin be lost or broken.
- It will engage with any other coupler.
- It permits of rigid trucks.
- It permits of making a "running switch" without danger.
- The pull is direct and from the center.
- The pull or strain is never on the knuckle pin.
- The swinging arm prevents damage to knuckle "from bumping."

The knuckle can not become disengaged from drawhead without removing swinging arm.

It pulls with lugs and not with bolts.

One object of the invention in question is to improve the construction of car-coupling of the Janney type, to prevent cars from uncoupling in event



SIMPLE MECHANISM OF THE DINSMORE.

of the breakage of a knuckle-pin, and to enable cars to couple automatically when the knuckle is closed and locked.

Another object of the invention is to prevent injury to the knuckle and knuckle-pin when cars come together in shifting and making up trains and when the knuckle is closed and locked, and to obviate the necessity and inconvenience of unlocking and opening knuckles preparatory to automatic coupling.

The Dinsmore coupler is simple and inexpensive in construction and positive and reliable in operation.

Messrs. Dennett & Turner, Pacific building, Washington, D. C., are the promoters of this invention and believe they have the correct mechanism for automatic car coupling.

## A Chance for Inventors.

In presenting the resources of Texas at the Trans-Mississippi and International Exposition at Omaha, a committee of enterprising Houston business men through Sam Richardson, secretary, offer a prize of \$100 cash for an acceptable plan or scheme through which an exhibit to represent Houston can produce the instantaneous impression that Houston connects deep water and the most important railroad center from a freight standpoint, between the Missouri River and the Pacific Coast. Seven of the fourteen lines of railroad entering that city handled in 1896, in and out, a total tonnage of 3,658,398 tons. Houston is now seeking an appropriation for a ship channel twenty-five feet deep to the jetties at the mouth of Galveston Bay. The \$100 will be paid the inventor who comes nearest enabling the people of Houston to carry out the idea they wish to impress upon the visitors at Omaha. Life, action, or movement in connection with this exhibit will be considered.

## Interesting Directory.

A curious invention is the device of a Duluth man for indicating the presence or absence at office of the person sought. The device is designed to enable callers having business with tenants to tell by a glance at the building directory whether the person desired is in his office or not. It takes the place of the usual building directory, giving the name and number of the office of each tenant. When one leaves his office for any length of time he can touch an electric button and his absence and the hour at which he will probably return will be indicated on the board at the entrance to the building. When he returns and seats himself at his desk he again touches the button and the board shows that he is again ready to receive callers. If it is not desirable to have an electric attachment, the information desired can be given by the office tenant as he enters or leaves the building, and the indicator on the directory board moved by hand.

The Baldwin Locomotive Works of Philadelphia have chartered a steamer to carry 22 locomotives to Finland.



### Fountain Bath Brush.

The main essential to cleanliness, as all the world knows, is water. But the modes of applying this cleansing fluid are many and various—some of these beginning with the advent of man, being of the simplest methods; and others requiring elaborate outfits, giving luxury and convenience at great cost.

In this department of hygiene the inventor has largely exercised his talent, producing among other bathing apparatus the fountain bath brush, than which there is nothing in this line comparatively cheaper or more effectively convenient.

The desirable qualities of an invention of this kind are found in the brush manufactured by the Fountain Bath Brush Company, of Grand Rapids, Mich. This fountain brush can be used both as a flesh and a shampoo brush, and is arranged for attaching to water faucets in bath tubs or wash basin, hot and cold water combined, cans, hot water bags or other means of supply. Its handle—to the end of which rubber hose can be easily secured—is hollow, as is the back to which various kinds of brushes can be removably attached. The water, regulated at will by the user, comes through the

parent company in all live communities and agents on all sides report splendid endorsements from people who have used the new hygienic outfit.

### The Zerograph.

The zerograph is a direct printing telegraph machine having keys operated like an ordinary typewriter. It is claimed that the faults inseparable from those instruments operated by the step-by-step system are avoided, and that, instead of short distances, very long distances—at least up to five hundred miles—can be worked over with ease at very rapid rates. The zerograph is entirely automatic in its mechanism and synchronism, and it requires no attendance when messages are received. Messages are given in duplicate; that is to say, the message is printed at each respective apparatus, each acting in turn as transmitter and receiver. It has no type wheel and no clockwork, as hitherto chiefly employed, nor does it work by a series of intermittent currents, set apart for each letter or character to be recorded. One improvement is in the construction of a mechanism with an

termed the starting magnet, is energized by the first electric impulse or current produced by the closing of a local electric circuit when a finger key is depressed; the armature in its movement also closes the line circuit connected with the synchronizing magnet at a distant or receiving apparatus, which magnet attracts its armature and withdraws the projection on the synchronizing arm engaged with the hook of its starting magnet. Both synchronizing arms are thus released simultaneously, and, being similarly constructed and adjusted, move at the same speed.

The synchronizing arm of the transmitting apparatus then makes contact with the projecting spring pin, operated by the finger key, thus closing another local circuit and energizing an electromagnet, which is termed the second contact magnet, the armature of which in its movement again closes the line circuit through a contact screw, and produces the second electric impulse or contact. This current again energizes the synchronizing magnet of the distant or receiving apparatus, the armature of which moves the other projection so as to stop the synchronizing arm against the spring pin corresponding with that operated by the finger key in the transmitting apparatus, and thus closes a local circuit as in the transmitting apparatus. These local circuits in both apparatus then operate each simultaneously an electro-magnet, which is termed the printing magnet, and which operates the plunger and causes the type to print, to feed the carriage along, carry the paper roll, and close another local circuit, on which circuit is an electromagnet which is termed the zero magnet, and which is energized to return the synchronizing arm to the zero position. To feed the paper on its roller so as to start a fresh line or column, another electromagnet is provided, which is termed the column magnet, which is energized by allowing the synchronizing arm to travel farther than the row of spring pins extends, where it is stopped by a fixed pin, (which is in the same local circuit as the spring pins) and also causes a contact to close the circuit containing this magnet.—*Mining and Scientific Press.*

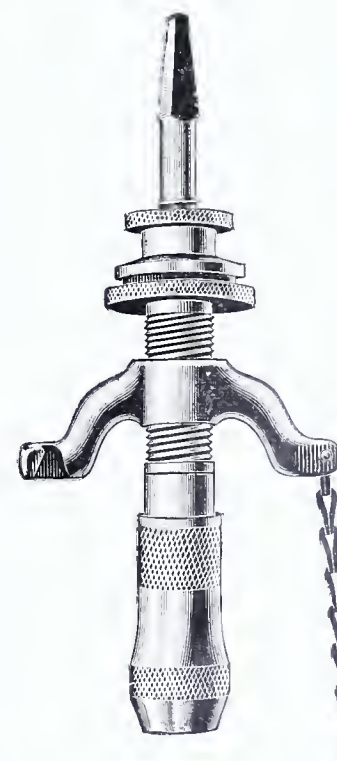
### Automatic Envelope Sealer.

Quite an important test of a labor-saving device has been in progress at the Treasury Department in Washington. The device is an automatic envelope sealer, and shows what American ingenuity can accomplish in the way of mechanics. Josiah Dupaw, an employe of the Treasury Department, knowing the enormous amount of mail sent out daily, conceived the idea of a machine that would seal the envelopes automatically, and this week the machine was completed and ready to be tested. Twenty-seven thousand interest checks were to be sent out from the loan division, and the machine was tried on that mail first.

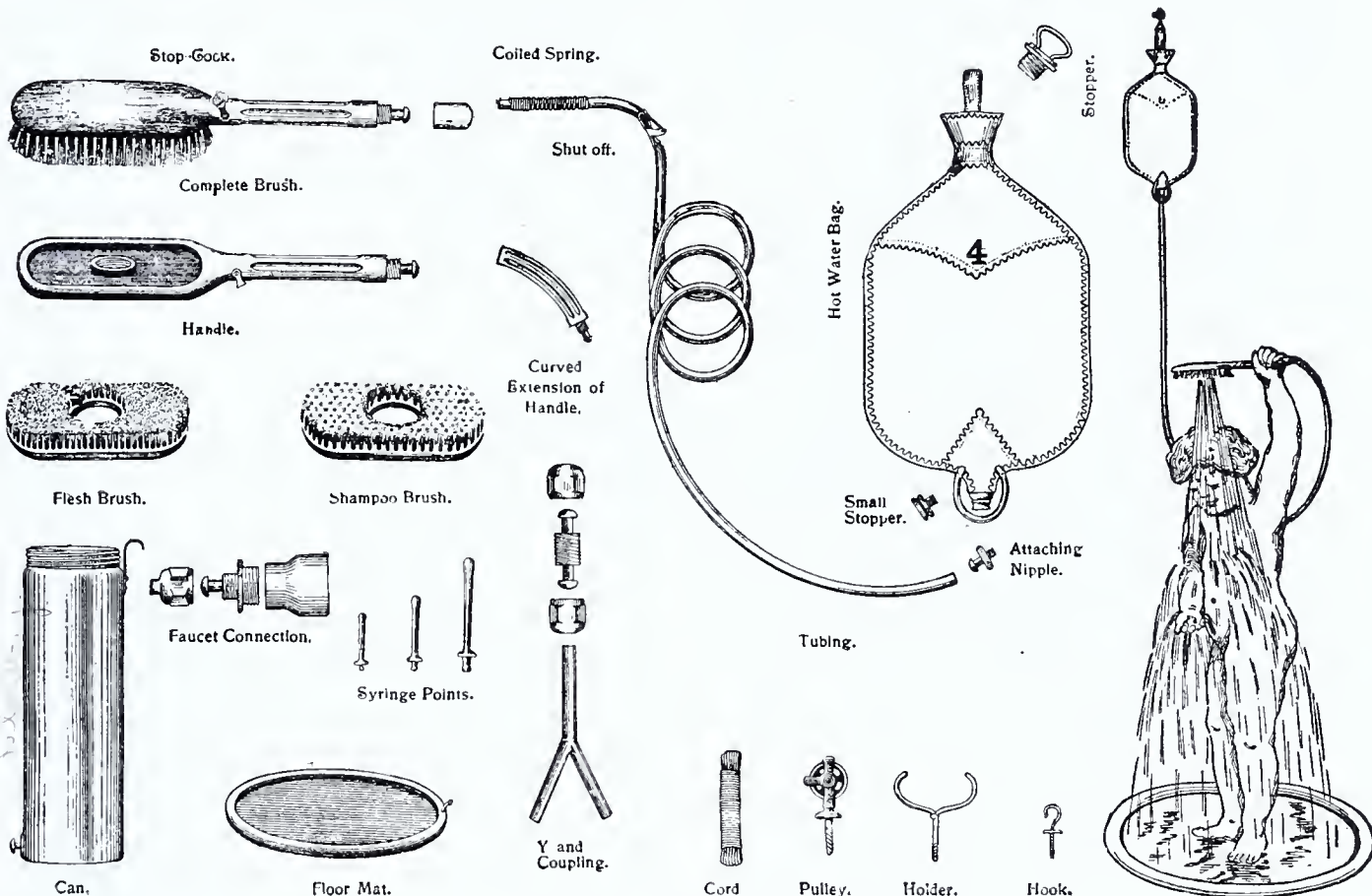
The sealer is something on the order of a printing press the envelopes being fed in. The machine moistens, folds and seals the envelope automatically. A very little practice on the part of the operator developed a capacity of 250 per minute. The department officials are delighted with the showing made by the machine.

### New Tool for 1898.

One of the handiest tools being put upon the market this year is the Mewer Automatic Feed Driller. As its name indicates its new feature is its Automatic Feed. The operator wastes no strength



for this valuable little article.



THE FOUNTAIN BATH BRUSH.

brush side of the back in such evenly-distributed quantities that a complete bath can be taken with four quarts. This includes a shower bath. In taking the latter it is only necessary to stand upon a rubber mat, elevate the brush above the head and turn on the liquid; a small rubber water bag hung at any convenient place in the room furnishes either hot or cold water, and effectually dispenses with the cumbersome ordinary bath tub, which not only requires, for taking a bath, a large amount of water, but must be kept in a room prepared especially for it.

The advantages of a good fountain bath brush are very apparent. There is a continual supply of pure water from it, which is applied once only, as is not the case when using the bath-tub; the apparatus is easily portable, can be carried in a small space anywhere, and put in operation in a few minutes, and should be a boon to travelling men—actors, agents, etc., and especially to those who find themselves in out-of-the-way places. At home the fountain brush is a most useful and convenient friend to mothers, who can with it bathe the little ones near the fire; to the sick, who must be bathed in bed, and to the family generally, each individual of which can have his or her own brush, and not be compelled to use that which has come in contact with the person of another.

With the fountain brush here mentioned the laws of hygiene can be observed. And not the least advantage in this particular, is that the system, while being strengthened by brush rubbing—when cold water is used—is not shocked by cold as is the case when the body is covered by the water in the bath-tub.

The cuts presented herewith show the separate parts of the fountain brush and articles of general utility in the bathing chamber. Agencies for the sale of these articles are being established by the

electro-magnetic arrangement, employed to produce a motion, and necessitating only two intermittent currents or impulses for each letter or character to be recorded. The first current starts the synchronous motion and the second current arrests the same at the proper letter. All other necessary mechanical actions are brought about through a system of electro-magnets and by a local source of electricity. A second improvement is in the construction of the electro-magnetic, and also in the mechanical arrangements employed to produce the motion necessary for printing in columns, and the automatic control of the same.

In each apparatus a series of finger keys are employed as in a typewriter, with which keys are connected spring pins, arranged in the arc of a circle. The center of this circle is the axis of an arm, which is termed the synchronizing arm, and which is adapted to be swung by an adjustable weight above the spring pins until arrested by any one pin moved into its path by a finger key. The spindle on which the synchronizing arm is mounted carries a governor or loose weight actuated in one direction only by a pawl connected to the spindle, which weight determines the speed of the arm. The spindle also carries a series of spring types arranged in the arc of a circle and corresponding with the finger keys, a plunger being employed to move each type when in position against a roll of paper upon a carriage; a suitable inking device, such as an ink ribbon, being employed for gaining a face impression. The synchronizing arm also carries two projections adapted to be moved by the armature of the synchronizing magnet, one of which is designed to be projected between the spring pins, while the other is engaged by a hook on the armature of an electro-magnet, so as to hold the arm in its initial or zero position. This magnet, which is



## NEEDED REFORM IN PATENT LAWS.

(Continued from first page.)

of patient toil; therefore, during the brief life of the patent the patentee should be fully protected and entitled to any possible advantages resulting from his invention, either through his own efforts or in combination with others. Natural conditions can most generally be relied upon to bring about some equitable arrangement between a patentee and those who are desirous of making use of his invention, and find it necessary to utilize the same for the advancement of their ideas. The policy of the Government should continue as it is, fostering and encouraging inventions, and by no legislation annul or seek to curtail by taxation or otherwise any patentee's rights during the period of his grant.

\* \* \*

I think it would undoubtedly be desirable that the government should charge a moderate sum after a patent has been force for a certain number of years, say seven to nine years, so as to compel the invalidation of patents which are not in themselves regarded as of sufficient value by their owners to be kept in force for a further period, or for the maximum life of the patent, by the payment of a moderate sum. I think that an annuity would be rather unjust if it began with the earlier years of the patent, a time when all the effort and all the money that the inventor may be able to obtain are needed for development.

\* \* \*

As to patents I should answer yes. As to trademarks and copyrights I should answer no. The right to a trade-mark is based, as I understand it, on actual use, so that if not used for a time such as may indicate abandonment, it is lost anyhow. Hence, as to trade-marks I can see no occasion for such legislation as is suggested. Practically the same is true of copyrights, at least it is so far true that I do not see any occasion for further legislation in that direction.

## REQUIRING WORKING AND ANNUITIES FROM FOREIGNERS.

If an inventor secures a patent on some article which he feels there should be a demand for in the foreign markets he must necessarily take patents in foreign countries, no matter how extortionate the charges and annuities may be or how unjust the conditions of such countries to sell in their own or any other country excepting this. Wherever our citizen does not take a foreign patent, manufacturers of that country have only to wait until our citizen has perfected his machine, when they can secure drawings, or at most purchase a machine, and can enter the field with trifling expense to themselves, thus taking advantage of our own citizen who perhaps has spent years of hard labor and thousands of dollars to perfect his invention, only to see the benefit to which he is entitled from the world outside our own country reduced down to the limits of the closest competition.

The burden of foreign taxes and working is so great as practically to shut out poor inventors from benefits of their inventions in foreign countries, and any of our reputable patent lawyers will warn their clients, whether rich or poor, against taking foreign patents if their clients do not intend to manufacture for the foreign markets, or feel thoroughly confident that the value of the invention is such as will make it eagerly sought for manufacture in such foreign countries.

If it is right that our citizens should of necessity pay five hundred, a thousand, fifteen hundred dollars or more to protect an invention in a foreign country during the life of such patent, in order to shut off unjust competition from citizens of such country, and the citizen of that country can get the same protection in this country for not to exceed seventy-five dollars, what has become of the doctrine of reciprocity, and does that doctrine consider whether a government treats our citizens with more or less justice than its own citizens, or simply whether our citizens are being accorded privileges commensurate with those extended by our own government?

The committee ventured the above from the fact that in not a single letter was this question considered with reference to its possible effect on our foreign trade.

It was not intended that the annuities and working must necessarily be exactly the same as in each respective foreign country, but of equal burden to those imposed upon our citizens.

The correspondence received showed that 44 per cent of the attorneys and 81 per cent of the manufacturers favor some form of annuities on the patents of foreigners whose respective countries impose such burdens on our citizens.

## SEPARATE COURTS FOR PATENT CASES.

The correspondence in relation to this subject seemed to point to the fact that some changes were

desirable, but the views were so varied that the committee was not able to form any conclusion.

Extracts from some of the letters in relation to this subject received by the committee are given below:

It is exceedingly desirable that a Court of Patent Appeals should be established to hear appeals from the Circuit Court of the United States. This court must necessarily sit in some one place, none better than Washington, and it would be a source of injustice to practitioners and clients to have to try their cases in the first instance in a court located in Washington; or if the court had branches it would greatly multiply and increase the labor and expense of the judicial system of the United States. The results obtained in the Circuit Courts of the United States are quite satisfactory enough not to destroy the present system, so far as the original jurisdiction is concerned. It would be of enormous value to the owners of patents if a Court of Patent Appeals could be established which would hear all appeals from the Circuit Courts which now go to the Circuit Court of Appeals, of which there are nine, in which the rulings are frequently diverse.

\* \* \*

Patent litigation is conducted in an objectionable manner and is too tedious and costly. It tends, however, to insure reasonable arrangements being made between parties themselves. The present practice cannot be improved except by authorizing the court to appoint one or more experts to report the state of the art and the character of the supposed invention and the points of presumed infringement instead of the great raft of testimony that is so confusing to a court as to be useless. In matters of fact the practice cannot be changed.

The idea of a special court for the trial of patent causes and to decide appeals from the Patent Office is quite old and is exceedingly important and desirable. As long ago as 1874 it was advocated by Commissioner Leggett, myself and others, but nothing was done until 1888, when a bill to establish such a court was introduced, and again in 1889, through the influence of Mr. Arthur Steuart, of Baltimore.

When he and I appeared before the House Judiciary committee in advocacy of the bill the committee at first scouted the idea, but after repeated hearings and full explanation of the reasons why such a court was a necessity the committee made a strong report in favor of the passage of the bill.

When we appeared before senate committee at the next session the chairman said they were about to pass the bill to establish the United States Court of Appeals, which he thought would afford the relief we sought and they would try that first, and if it should not accomplish the desired objects they could then pass our bill. Hence the matter was dropped for the time being.

I believe it is the consensus of opinion among patent attorneys and those involved in patent litigation that the establishment of the Court of Appeals has not benefitted the condition of affairs so far as patents are concerned, and that the establishment of a patent court is a necessity.

\* \* \*

No change seems desirable in the judicial system. The idea of an expert court to try patent cases is a fallacy. I am a professional expert in patent matters, and I would rather have my patent interests adjudged by courts of present construction than by any court composed of my professional competitors. As to the length of time involved in litigation, it is not a matter controlled by the court, the delays generally being due to the desires of the litigants. If the courts get over-crowded there will be official delays, and these delays apply to all litigations in such court, and it hardly seems just to provide a special branch of judicature to avoid delays in one class of litigations while leaving the others tied up. If one special court is desirable, then many more special courts would be equally desirable.

In this connection, however, it may be stated that under former practice the judgment of a lower court on a patent could be appealed to the Supreme Court as a court of last resort, which was the end of that litigation, and the patentee and the public could know that the patent was good or bad, and could know of its scope. Under the later law the several Circuit Courts of Appeal are the courts of last resort, but, unfortunately, the judgment of one Circuit Court is not necessarily conclusive as to another circuit, and there is, therefore, practically no last resort until all of the circuits are exhausted. The circuit appeal court system should be supplemented by a final appeal court within its organization.

## PATENT OFFICE PROCEDURE.

The same remarks may be made in relation to this subject as to separate courts, etc., and the committee hopes that this subject may also be fully discussed and suggestions made regarding same.

It has been suggested that the patent office be asked to print upon the face of each patent the

class and<sup>7</sup>/<sub>100</sub> sub-class to which such patent belong and the committee will recommend such action unless some valid objection is raised.

Extracts from a few of the letters relating to this subject received by the committee are given below:

In regard to the fourth point, it seems to me that the present arrangements, with the recent amendments to patent office practice and patent office law, are without any decided objection, except as to a few points, one of which may be mentioned as relating to cases in interference. It seems to me that the procedure in deciding interferences at present is defective. The first decision is given by practically one man—the examiner of interferences, who controls his assistants. An appeal lies from him to the board of examiners in chief, a body of trained men of long experience in the patent office, and it frequently happens that they reverse the decision of the examiner of interferences. A further appeal may be made to the commissioner himself, who, as is well known, is generally in the patent office but for a short time.

Now it seems to me that after a decision has been made by the board of examiners in chief, constituted of several men, it is rather absurd, not to say ridiculous, to have such decision reviewed by a single man, and his decision made to dominate the decision of the board. It seems to me that at least a higher commission of skilled men, appointed after long terms and thoroughly trained in patent law and technical matters, should alone be able to review such an appeal, if any appeal is to be had from the decision of the board of examiners in chief, and that the personal error, or bias it may be, of a single man should never by any possibility, either accidental or otherwise, defeat the ends of justice. Let the responsibility be divided in this case just as the responsibility in the Supreme Court of the United States is divided. Let there be a supreme board, so to speak, in the patent office, which will decide all cases of interference.

\* \* \*

If the Commissioner of Patents would enforce a rule that all applications should not only be examined in the order of their filing but that all amendments should take precedence according to the date of filing of the application to which they relate, the business of the office would be facilitated.

The laws relative to procurement of design patents should also, in our opinion, be modified so as to place such applications on the same basis as applications for mechanical patents, as respects the payment of fees. For instance, the statutes relating to design patents should be changed to allow an applicant to file an application for a three and one-half year patent, and after notice of allowance of his application, permit him to pay an additional fee and have the patent issue for either seven or fourteen years. The present statute requires the applicant to elect in his application the term of his patent and pay the full fee thereof, resulting, frequently, in a valuable patent being granted for a very short term, or that the applicant having paid for a full term (fourteen years) is refused a patent, but receives no rebate, although he could have had a full examination as to the patentability of his design by paying the fee for a three and a half year patent only.

The only change that I could suggest in the patent office is the devotion of some of that four and a half million dollars for the employment of an adequate and competent force to expediate and render more certain examinations, and also the clearing out of the office building of all the other business. As it is now the quarters are so cramped and the force so inadequate that it is practically impossible to do good work, and good work is not done. I have known cases where an examiner in a division, either by himself or his assistants, has allowed two patents to two different individuals for exactly the same invention, and both pending at the same time in the office, and without any determination between them as to which one was the first inventor. This is an inexcusable mistake under any circumstances.

Another change which I would recommend would be the announcement upon the face of each patent of the class and sub-class to which it belongs in the then system of classification, and also a sub-number showing its position in that class or sub-class which would enable any person looking at the patent to determine how many patents in that sub-class had been issued, and the obtaining of the copies of those patents would give him the state of the art as it appears in the patent office.

\* \* \*

Patent office proceedings are the result of evolution from chaos to order. The former Commission, Mr. Seymour, tried to build up an improved structure of his own; it tumbled about his head and could not be carried out, and the old practice in substance was restored in less than a year. Improvements are constantly being made where defects are found; radical changes are only urged by



the ignorant and inexperienced and are suicidal.

Permit me to call attention to the fact that congress is constantly besieged by parties desiring special legislation to remove imaginary grievances, and the number of bills introduced annually that are aimed to kill our patent system is astonishing. Every man and every association that has any influence should bend their energies to uphold the present patent system substantially unchanged, and at the same time seek to promote the efficiency of the patent office by turning the department of the interior out of the patent office building, and giving all the room and help that can be advantageously used, and in expending whatever is required of the \$5,000,000 patent fund accumulation, so that the actions of the office may be as reliable as possible.

\* \* \*

Our present patent office system was devised when the business was small. It was well adapted for the doing of a small business. Practically the business has increased to such an extent that the system is open to very serious objection. But I know of no good way to change it for the better except one, which would be so radical that I doubt if it could be done.

Up to the point of the rejection of an application by the examiner I would not make any change, that is, by legislation; but I would abolish the board of examiners in chief, take away from the commissioner his judicial power and establish in the patent office a single court, with judges having the rank and pay of judges of the United States Circuit Court; and give to that court jurisdiction of all appeals, and let their decision be final, with only an appeal to the present Circuit court of appeals. I would also give to such proposed new court the control and supervision of the examiners in the performance of their official duties. This would leave the Commissioner of Patents as only an executive officer. But, as stated above, this change would be too radical to be acceptable, at least at present.

\* \* \*

We would make no change in procedure; but the force should be largely increased, and digests of inventions should be compiled and published and these digests should ultimately include foreign patents and scientific publications. The patent office is supposed to be for the dissemination of knowledge concerning industrial arts. For this purpose its only medium, the Official Gazette, is a mere abortion.

#### National Association of Manufacturers.

The largest gathering in the history of the National Association of Manufacturers took place in New York, at their third annual convention held on Jan. 25-27. At this meeting industrial affairs were discussed, including various interests, among them the American merchant marine; the proposed department of commerce and industry; foreign sample warehouses; reform in the consular service, and commercial reciprocity. A resolution concerning the imitation of American goods and trade-marks in foreign countries was offered, and it was resolved that the attention of the President of the United States and that of congress should be called to this fact, for the purpose of inducing other governments to pass laws prohibiting the importation and sale of all goods not branded with the country of origin; as it is well known that some countries permit the importation of goods not bearing the home brand, and thereafter putting thereon such names or trade-marks as may be best used in selling them. A resolution touching the Paris Exposition, to be held in 1900, and one concerning the U. S. Patent Office were also offered. The first of these recommended a proper exhibit of the manufactures of the United States, and expressed the desire of the Association, that congress should make a liberal appropriation for this purpose. The patent office feature was the endorsement of the bill prepared by Mr. A. P. Greeley, Assistant Commissioner of Patents, now pending before congress, and having for its object the increase of facilities for transacting patent office business. The Association held its annual election, in which most of the old officers retained their positions. Theodore C. Search was chosen president, Charles A. Schieren, treasurer, and E. P. Wilson secretary. Their office will be in the Bourse building, at Philadelphia. The Association will hold its next annual convention at Cincinnati.

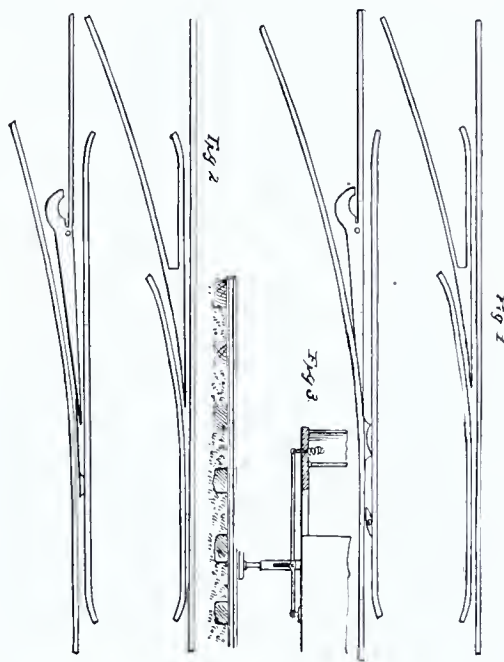
During the convention President McKinley delivered an address, in which he encouraged the man-

ufacturer and declared his faith in the future prosperity of the country, saying in part: "I believe we will reoccupy the field temporarily lost to us and go on to the peaceful conquest of new and greater fields of trade and commerce. The recovery will come slowly, perhaps, but it will come, and when it does we will be steadier and will better know how to avoid exposure hereafter."

#### Shufflebarger's One-Piece Automatic Railway Switch.

A simple, automatic, and desirable railway switch, both for steam and street railway service is a device that many inventors have devoted their energies to. Mr. M. N. Shufflebarger of Bristol, Tenn., believes he has finally discovered the correct principle. His invention on which patents were allowed August 20th last, is practically composed of one piece (the point) which is so made as to be entirely automatic. While it is especially adapted for street railways, tramways, etc., it is also applicable to steam railways.

It is positive in action, not likely to get out of order and is inexpensive to build. The illustration herewith shows the design and mechanism. Fig. 1,



shows the switch closed with the shifter, which is attached to the truck, in the act of opening it. Fig. 2, shows switch open, and Fig. 3, shows the shifter, a very cheap attachment carried by the truck of the car, which operates on two cams at the point and an extension at the heel of the switch piece, or point, thus opening and closing the switch as the car moves forward.

Mr. Shufflebarger has been exhibiting this switch in Washington and other cities, where it has elicited much favorable consideration from street railway managements and others. While it is Mr. Shufflebarger's desire to dispose of this patent outright to some promotor or syndicate who are in a position to negotiate the successful application and use on the various railway systems of the country, he is, nevertheless, considering propositions for territorial or state rights.

This is an invention that promises so well it would seem the inventor ought to have little trouble in realizing handsomely on his genius, and with rare good sense Mr. Shufflebarger decides to dispose of the patent for such a low figure as to make it a rare inducement to capitalists to take hold of. It is an invention that needs the attention of a promotor who means business and with such Mr. Shufflebarger invites correspondence. Mr. Shufflebarger is just now in Baltimore consulting some railway people but soon will be at his home, 817 Main street, Bristol, Tenn., where all inquires should be addressed.

#### About Toothpicks.

The best toothpicks made anywhere in the world come from Portugal. They are whittled by hand from orange-wood splints by peasant girls, the only tool used being an ordinary jack-knife. These picks are as smooth as ivory and will not break into splinters. They are inexpensive. The girls who make the picks receive less than ten cents a day. As the duty on foreign-made toothpicks is only 35 per cent, they can be sold here for less than picks of similar quality could be manufactured in this country, despite the improved American machinery and skilled labor.

#### The Martin Elevated Cycle Railway.

Mr. W. H. Martin,

Mobile, Ala.

DEAR SIR: I have carefully examined, with due regard to detail, the model and plans of your "Elevated Cycle Railway."

I can see no reason why man power, with a pressure applied on the pedal should not rapidly propel the carriage considering its proportional weight.

I also consider it available to the application of electric power transmitted to a light armature at the base of the driving chair and where grades are to be surmounted, this power could be introduced without heavy additional cost. The mechanical brake I consider ingenious, effective and safe. The method of switching is thoroughly practicable.

The method of suspending rails, maintaining alignments, and securing vertically in central main post—care must be taken to so adjust the rail joints, to provide for expansion, and contraction while maintaining correct tension in the suspension rods.

Should it become necessary to locate any line on curves of radii less than 1,500 feet, a modification would be necessary in the lateral bracing to pressure curvature to avoid increased friction in wheels. This modification can be easily made.

When slight inequalities are met with in the ground, it would be better to add to the length of central posts to maintain level. Upon the whole, I consider that for the purpose you intend the "Elevated Cycle Railway," it should meet every requirement, and this method of travel or parcel transportation would be best adapted to suburban localities, pleasure resorts or intercourse between towns and cities.

The railway is novel in many respects, and doubtless will be so regarded by the public. It may be viewed as purely an Elevated Cycle Railway for pleasure, but we must recollect the bicycle was also at first regarded as purely a thing for pleasure, whereas today it enters into every day economy, and to a host of our population is considered indispensable.

The cost per mile over level country ought not to exceed \$1,500 and maintenance a minimum. Cost of operation would depend largely upon the amount of travel and would be in proportion thereto. For example, a great number of passengers would necessitate an increased number of switches or sidings and each siding would require an attendant.

The fares could be rated rather after the method in vogue by street railways than a mileage rate, but should not be less than 5 cents as a mileage minimum.

It may be said that the mileage returns will prove problematic, but I am disposed to believe that if the Elevated Cycle Railway is constructed on trial near any one of our cities it will be demonstrated that it will pay liberally as an investment.

Let us assume that five miles are built on trial and hazard the following return for one year:

Five miles will cost completed say.....	\$7,500.00
Cost of maintenance one year.....	\$ 500.00
" " operation.....	1,500.00
	\$2,000.00.....
	\$2,000.00
	\$9,500.00
20 passengers each way per day 25 cents each for 365 days.....	\$3,650.00
Less the above.....	\$2,000.00
" Int. 6 per ct. \$700.00.....	510.00
	\$2,510.00
	\$2,510.00
Net income for one year.....	\$1,080.00

From the above example, it would appear that for so small a patronage five miles built and operated, over 10 per cent net earnings would be realized. I cannot but think that the enterprise would realize much greater results, as I consider it as mechanical and has much merit.

T. W. NICOLS,

Civil Engineer.

I concur in the above.

J. E. BUCK,

Civil Engineer.

Mobile, Ala., Jan. 14, 1898.

#### The Belman Skirt Holder.

Patent attorneys will be interested to learn that the Belman Suit and Skirt Holder which is advertised so extensively by Woodward & Lothrop, is the invention of one of their own profession. Mr. L. M. Marble invented and patented this Suit Holder, but not caring to sell it under his own name, twisted the letters of his name so as to form the word "Belmar," and thus intitled the Holder. The invention is a meritorious one, and is coming rapidly into general use. At Woodward and Lothrop's it is being demonstrated on the 5th floor and there is quite an attractive display stand.



# THE GROWTH OF THE STEAM ENGINE.

By L. N. GILLIS.

## I. HERO TO NEWCOMEN.

It is necessary, in the first place, to premise that the articles which may appear under this head are not intended for scientific dissertations on the different devices which go to make up the modern steam engine; but, rather as a series of sketches on the progress of the invention. Further, it is not the intention of the author to enter into each minute detail of the different steps, nor to attempt to describe the same at length. To do this would entail the publication of several large volumes. Some idea can be

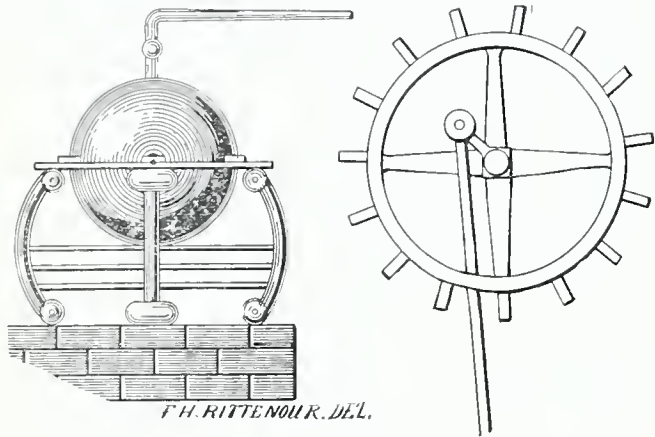


FIG. 1.

obtained of the magnitude of such an effort, should it be attempted, by the fact that, in England alone, there were issued over 250 patents between the years 1698 and 1827, on steam engines.

As early as 130 B. C. the expansive force of steam was known and used, though the device to which it was applied was but a philosophical toy. Still, this small beginning was the origin of the finished product known as the compound condensing engine.

Hero's eolipile, as it is called, consisted in a boiler supported on a tripod. From the upper surface of the boiler extended a pair of upright arms, one of which was hollow and communicated with the inside of the boiler. Between these arms was pivoted a hollow sphere, revolving easily on its bearings and communicating with the hollow arm. Projecting from points diametrically opposite were two

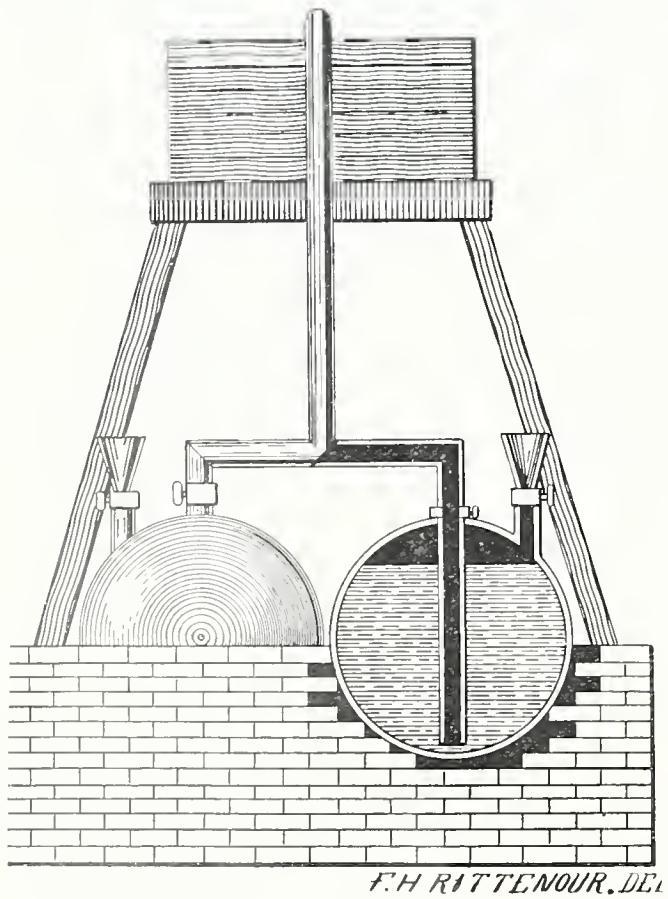


FIG. 2.

L-shaped tubes, so arranged that the bottom portions of the L's pointed in opposite directions. When the steam was generated, by heat applied beneath the boiler, it passed up the tubular arm and into the sphere; from thence it issued, more or less forcibly, through the L-shaped tubes and the

reaction against the air caused the globe to revolve rapidly. The common Barkers' mill of today is the remaining representative of this device.

From this time until a little over two centuries ago we hear nothing further of steam or the steam engine. It would almost seem that, in the ages that followed the dissolution of the great Roman Empire, all knowledge perished.

Though Solomon de Caus had discovered the expansive force of steam and described a fountain adapted to operate by use of this power in 1615 he cannot properly be called (though often so entitled) one of the inventors of the steam engine. His device was but a vessel containing water, having an out-let pipe with the end dipping below the surface of the water in the vessel. When steam was generated, the water was forced out of the pipe. This did not constitute a steam engine in the sense of the word in which it is accepted at the present time and was practically no use in any event. Nevertheless, to de Caus belongs the credit of being the first of modern scientists to use the power of steam and France may well claim that he took the first step leading to the present use of steam as a power.

Fourteen years later an Italian, Giovanni Branca, published a drawing and account of what we may consider the first steam engine, since it was the first application of steam to operate machinery. Branca's own drawing, being more in the nature of a curiosity than a practical sketch, has been omitted but I have shown, in Figure 1, a view that will give some idea of the operation of this engine. It will

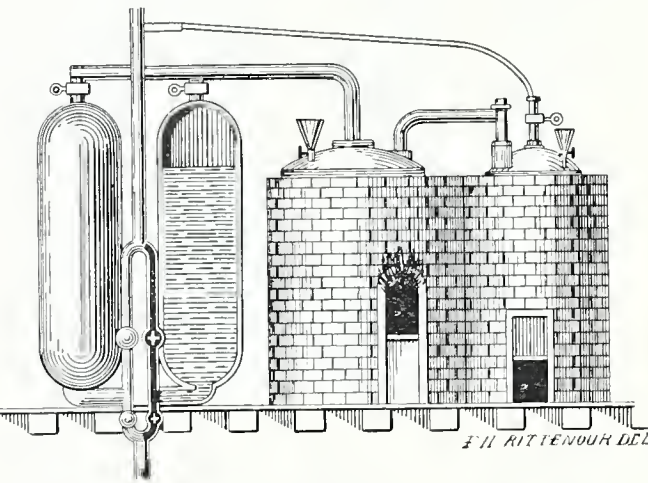


FIG. 3.

be seen that this is what we now call a rotary impact engine and it is worth while to step forward and note that one of the most recent engines of our own time is operated on this principle.

The next person who claims our attention is the much lauded Marquis of Worcester who, in his *Century of Inventions*, describes a "fire water-work." He did not make any drawings of which we have any knowledge, but his description seems to indicate a construction similar to that shown in Figure 2. The Marquis has often been claimed, by English writers, as the earliest modern inventor (if such an expression can be used) of the steam engine; but de Caus' invention, which must have been known to him, is very similar to his, the difference consisting in the addition of another cylinder and some valves. His engine is open to the same criticism that de Caus' was, and can hardly be called by the name of engine in its more limited sense.

His own description, taken from the manuscript, dated 1663, in the British Museum, says of the device that it is "An admirable and most forcible way to drive up water by fire, not by drawing or sucking it upwards, for that must be, as the philosopher calls it, *infra sphaeram activitatis*, which is but at such a distance. But this way hath no bound, if the vessels be strong enough; for I have taken a piece of a whole cannon, whereof the end was burst, and filled it three-quarters full, stopping and screwing up the broken end, as also the touch-hole, and making a constant fire under it; within twenty-four hours it burst, and made a great crack; so that having found a way to make my vessels, so that they are strengthened by the force within them, and the one to fill after the other, I have seen the water run like a constant fountain stream forty feet high; one vessel of water, rarified by fire, driveth up forty of cold water; and a man that tends the work, is but to turn two cocks, that one vessel of water being consumed, another begins to force and refill with cold water, and so successively; the fire being tended, and kept constant, which the self-same person may likewise abundantly perform in the in-

terim, between the necessity of turning the said cocks."

Up to 1680 the efforts of inventors, with the exception of Branca, were confined to devices for raising water by the direct application of steam. In this year, however, Dr. Denis Pepin, acting under the patronage of the Elector of Hesse, instituted a series of experiments in the use of steam,

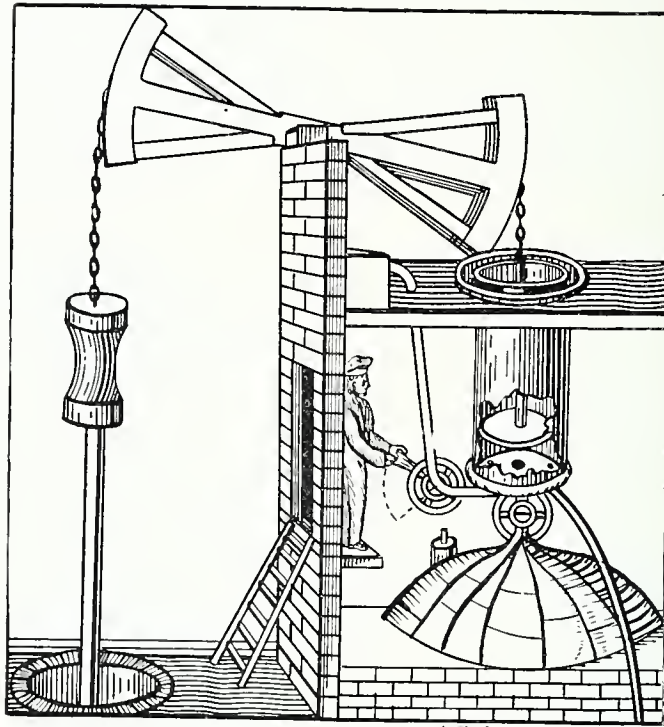


FIG. 4.

which his writings show tended toward the discovery of what was afterwards called the Atmospheric engine; but the experiments of Captain Savary, an Englishman, having been brought to the notice of Pepin's patron, the latter directed Pepin to improve upon that device. In this effort, the experiments along the line of the Atmospheric engine were abandoned.

Savary's invention is the first recorded use of the condensation of steam to produce power. It consisted of a pair of cylinders supplied with steam from an independent boiler and valves arranged to cut off the supply of steam from either one of the cylinders and then permit it to condense. Other valves were used to control the admission and overflow of water. In operation one cylinder was filled with steam which was left to condense while the second cylinder was being filled. The condensation of the steam in the first cylinder, producing a partial vacuum, caused the water to flow into this cylinder. Steam was now shut off the second cylinder and supplied to the first with the result that the water was forcibly ejected therefrom. By alternating the use of the two cylinders a pretty constant supply was maintained. The modern pulsometer pump is a direct outgrowth of this device and on this account the device may be said to be a steam pump. Figure 3 shows a view of this device taken from an old book on the subject.

Pepin's attempt to improve upon this device was a failure, in so far as bettering the construction; but it had at least one important result for it gave us the safety valve.

The attempt of Savary, while never being generally used, served to familiarize the English mechanics with the power of steam and its property of

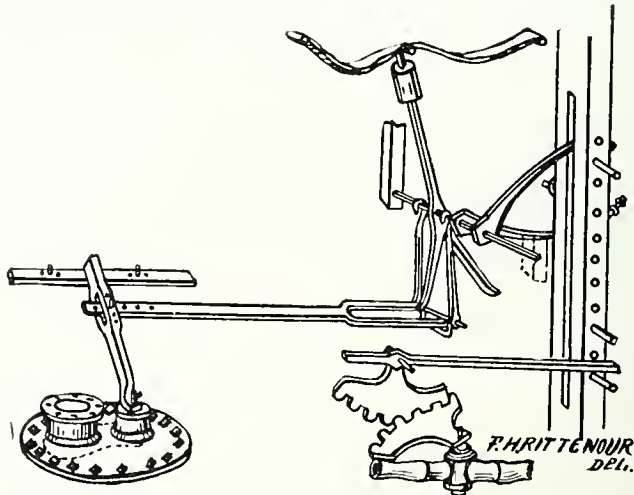


FIG. 5.

condensing when cooled. This step was of the greatest importance and the immediate result was that it was felt that Savary's device was inadequate for the purpose. Almost immediately a blacksmith by the name of Newcomen, began to experiment and the ultimate result was the invention of the Atmospheric engine. In this he was associated with a fellow townsman, John Cawley by name, and a glazier by trade. Savary, hearing of their



discovery and of their being about to procure a patent, claimed that their use of the condensation of steam infringed upon his patent and they were forced to admit him as an associate in the patent that they obtained in 1705.

The view here shown, Figure 4, is a copy of a drawing dated 1720, showing an application of the Newcomen engine. This drawing is of especial interest, in that it shows the earliest form of this engine, that in which the valves were operated by hand.

The real working force, from which the engine derived its name, was the pressure of the air on the upper side of the piston, the steam being used only to permit the piston to raise, and by its condensation, to form a vacuum when the piston had been raised. The power of this engine was, therefore, limited to a pressure of  $14\frac{3}{4}$  lbs. per square inch of piston surface, and this was greatly diminished by the imperfect condensation and the friction of the piston itself as well as the other parts of the device. In most cases, little more than one-third of the power, calculated in this way, could be obtained from the engine. Still, with all the defects that such a crude invention was certain to have, these engines were installed all over England and even found their way to the Continent.

As late as 1827 Elijah Galloway says: "We find the *atmospheric* engine used with different modifications to a great extent even at the present day."

It will be seen from the diagrammatic view here presented that the condensation was effected by a jet of cold water. This method is said to be really due to a defect in one of the earlier engines. The original method was to surround the cylinder with a casing containing cold water, but by accident a cylinder was cast with a small flaw in it which admitted the water to the interior in a jet. It was noticed that this engine ran faster than the older ones and when the defect was found it led to experiments. The result of these was that, thereafter all engines were fitted with pipes to supply the stream of water.

The next advance was made by a small boy, and his improvement arose, more from his laziness than from a truly inventive turn of mind. Being employed to turn the valves of a Newcomen engine, he fastened a cord to the beam and to the valve handle, thus shutting the valve at the end of the stroke; a weight on the handle returned the valve to its open position. This was afterwards improved by Henry Beighton, who arranged a system of levers to make the engine a self acting one. The first engine having this improvement was erected in 1718.

With one other improvement the atmospheric engine reached the zenith of its perfection and use. The old method of arranging the boiler and cylinder was to place the latter on top of the boiler. Of this arrangement Galloway says: "The writer has seen one of these engines near Newcastle, where the top of the boiler rose and fell at least half an inch at each reversion of the stroke."

It is not a matter of much wonder that, under these conditions people thought the engines were dangerous. Certainly it is fortunate that they used a very low pressure. (The pressure was so low that the boilers used to fail by collapsing from accidental condensation of the steam).

The atmospheric engine, as the pioneer in the art, was necessarily full of imperfections. It was, however, generally adopted for raising water from the English mines, although little used for other purposes. Dependent as they were on the pressure of the atmosphere, it was essential that the cylinders should be very large. In many cases they exceeded five feet in diameter, and in one case, at Tynemouth Moor, we find an engine in use with a cylinder of seventy-five inches diameter.

Since the power of these engines was always exerted by a pull rather than a push, the most convenient method of connecting the walking-beam to the piston and the pump rods was by some sort of flexible connection. The simplest form was, of course, the one to be used. We find therefore chains used wholly or in part for this purpose, and since the strain should always be exerted in a line tangential to the walking beam, the early inventors all made the walking beams with the ends in the arc of a circle with its center in the axis of the bearings. The valves were also suspended from a circular lug attached to the side of the walking beam. This was really a perfect parallel motion.

In Figure 5 is shown the curious valve gear of one of these Newcomen engines. The operating rod B, being attached by a chain to the walking beam, served to move the different valves. The construction of the valve gearing, it will be noted, is hardly up to our modern requirements. Note the two segmental gears working at right angles. The veriest tyro in machine shop work would tell you that such things would not do. Yet, 250 years from now, our descendants will probably wonder at the crudeness of our own ideas.

Taking full account of the defects in the construction of these engines, we must still admit that the names of Savary and Newcomen demand a high place in the annals of steam engineering. The

latter, in spite of the many efforts to belittle his work, may be truly called The Father of the Steam Engine. He was the first to have a true conception of the use of steam as a power and not even Watts can claim a higher fame.

The figure shown will give some idea of the manner in which one of these engines worked. The boiler A, was usually of a globular form and generally, as noted above, supported the cylinder. A steam pipe provided with a valve opened into the latter from the boiler. This cylinder was open at the upper end, and the piston which moved therein, was rendered steam tight by a packing of hemp, and in addition a stream of water was kept on top of the head. The water injection pipe *a* and the outlet *b* both had valves, that in *b* being usually a check valve. By the proper manipulation of these valves steam was admitted and the piston allowed to raise, by reason of the weight of the pump rods; the steam was then cut off and cold water admitted. This condensed the steam and created a partial vacuum, whereupon the pressure of the air on the upper surface of the piston forced it in and raised

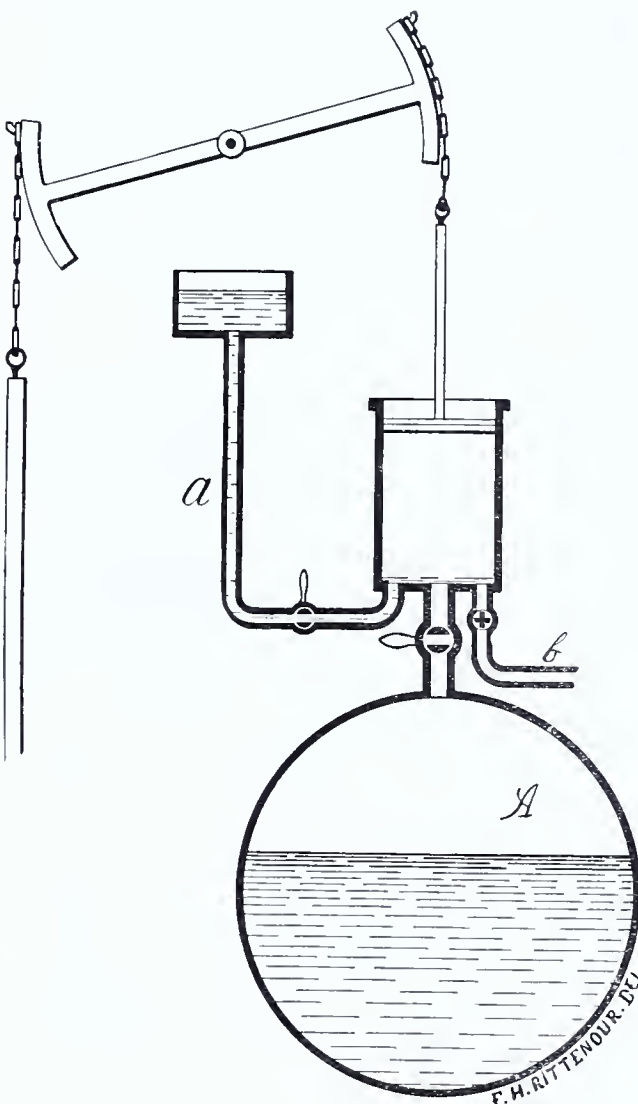


FIG. 6.

the pump rods. This operation was repeated, usually at the rate of about fifteen strokes to the minute.

There was but one attempt of any moment to apply Newcomen's engine to any other purpose than that of raising water and that was an effort, by Jonathan Hulls to *propel a boat by steam*. That this was ever put in practice is a matter of a great deal of doubt, but that he had the idea is unquestionable, for a patent was issued to him upon an invention of that sort.

The appended table gives a list of the English patents on steam engines, granted during the period covered by the above described inventions. It will be noted that the first one is dated just 200 years back:

- 1698.—Thomas Savary, London. Device to and method of raising water by steam. (Includes the method of effecting a vacuum by condensing the steam).  
1705.—Thomas Newcomen and John Cawley, Dartmouth; and Thomas Savary, London. Condensing steam under a piston.  
1736.—Jonathan Hulls, London. Boat propelled by steam.  
1759.—John Brindley, Lancaster. Boiler.  
1766.—John Blakey, London. Improvement on Savary's engine.

#### Copper Plated Aluminum.

An Austrian exchange states that M. Wachnitz, a mechanic of Nuernburg, Germany, has succeeded in plating aluminum with copper by a welding process. The plated sheets can easily be soldered, grooved, tinned, and nicked. The plating may be of any thickness desired; even with the thinnest sheets there is no separation when rolled or drawn. Larger sample sheets have already been submitted to the inspection of the Imperial navy department and other large manufacturing concerns. The obstacles to a still wider use of aluminum which could

be expected in view of its great lightness, have been its poor ability to solder, its weak power of resistance to numerous fluids, especially salt water, and the further fact that paint does not adhere to it very well. All these objections would be removed by this invention. As aluminum is not magnetic, and its conductivity for heat and electricity is exceeded only by gold, silver, and copper, copper-plated aluminum would find extensive use in electro-technics.—*American Manufacturer*.

#### Patent Rights in Turkey.

I have before me a circular letter from a patent solicitor located at Constantinople, which while showing commendable enterprise on his part in drumming up business so far from home, is sufficiently candid to confirm a suspicion existing in most minds that Turkey is very much behind the age and too much under the despotic rule of Abdul Hamid to afford the security necessary to induce many inventors to invest their money in Turkish patent rights.

The letter starts out in this wise: "I have to inform you that the treaty of peace between Turkey and Greece has been signed, in consequence of which the Imperial Ottoman Government is making every effort to improve the trade and commerce of the Empire. It would therefore be superfluous to set forth the increased necessity of patenting inventions and protecting merchandise under trademarks."

Further on the writer says: "But I wish it to be clearly understood that all appliances covering arms and munitions of war, or electricity in any form, are referred to the Council of the Ministry of Commerce which has the right to reject any application it thinks fit to, without being in any way bound to give a reason in writing." After stating that in accordance with "private advice from officials of the patent office," "when applications of the above nature are addressed to me I always recommend my client to go on with the application even though I am certain that the application will be rejected," he says "I may here state that electricity has been prohibited by the Sultan and not until he withdraws his Irade or leaves the throne can electricity be used in the Empire, but there is every reason to hope that the foolish person who advised him to prohibit it will see the folly of his action and advise in a contrary sense, or that others will develop the necessary courage to point out to His Majesty what the Empire is losing through electricity being shut out."

The letter concludes with a warning against the postal authorities which it would seem the inventor might fittingly extend to every other department of the government and its officials beginning with Abdul Hamid himself: "United States correspondents please note, 'so the letter says,' that to insure safe and speedy delivery of your letters and communications, the envelope should bear the words 'via London Open Mail.' If not addressed in this way they will fall into the hands of the Turkish Postal Authorities and then it is a matter of luck if they ever reach their addressee."

It would be hard to find material in more compact form than this letter affords from which to draw a picture of existing Turkish conditions and the conclusions with respect to patents there, must be that the American inventor who has money to throw at the birds can make a very appropriate start by beginning on Turkey.

JOSEPH A. MINTURN.  
Indianapolis, Ind., Jan. 22, 1898.

#### Effect of New Law Relating to Foreign Patents.

DEAR EDITOR: In a recent issue of the Chicago Record I note a reference to a new law in regard to foreign patents for inventions and fearing that by reason of the incompleteness of the note inventors might be deceived, I would call attention to Section 8 of the Act approved March 3, 1897, under consideration, wherein it is said that "sections one, two, three and four, amending sections 4886, 4920, 4887 and 4894 of the Revised Statutes, shall not apply to any patent granted prior to said date, nor to any application filed prior to said date, nor to any patent granted on such an application" referring to the date on which the Act is to take effect, namely, January 1, 1898. Thus you will observe that if foreign applications be filed immediately on United States applications which have been pending in the United States Patent Office prior to January 1, 1898, such foreign applications eventuating into patents may and probably will cut short the terms of United States patents when issued and by so doing our inventors might ignorantly forfeit and prejudice their rights.

Yours truly,

J. C. SWEET.

Des Moines, Iowa, Dec. 31, 1897.



## Making Big Guns for the Navy.

(HENRY A. WILEY, U. S. N., in New York Sun.)

### HISTORICAL.

To understand and appreciate what the United States has accomplished in modern gun construction it is only necessary to know the history of this great plant, its creation, its growth, the difficulties overcome in its perfect equipment and the character of the products turned out. Fourteen years ago there was not a modern high power, breach loading rifle in the United States. Today every large gun supplied to our growing navy is manufactured at the Washington factory and conceded by foreign as well as claimed by our own ordnance experts to be the equal, if not the superior of any guns in the world.

Before the civil war, when smooth bores and muzzle loaders were the only great guns known on land or sea, and cast iron was the material used in their construction, the United States possessed the best guns afloat. But after the civil war a long period of absolute inactivity followed in this country, both in the matter of shipbuilding and the manufacture of guns, while the great powers of Europe strove to keep pace with the demands of the times in everything pertaining to modern warfare. The condition to which our defenses, ashore and afloat, were reduced is a matter of history. With no ships worthy of the nation, we had no guns capable of protecting us against those of other countries.

But in 1881 a step was made in the right direction, when four new modern steel cruisers—the "Chicago," the "Boston," the "Atlanta" and the "Dolphin"—were laid down, the foundation of a modern and efficient fleet. A modern fleet necessitated modern guns, which we did not have, and as these vessels neared completion in 1883 the question of their armament had become a serious one. Immediate steps were taken to meet the deficiency, but it was not until the early spring of 1887 that a systematic building plan was begun. The work of building and equipping has proceeded ever since, but slowly and gradually, that there should be no interruption in the construction of guns.

### DESCRIPTION OF THE PLANT.

The sight in the gun shop is an impressive one, even to a person who is accustomed to seeing large guns, for while he may have seen the largest machine shops, many times larger than this one, containing a greater number of machines, employing 100 times more men, and requiring many times the power to run the machines, he has never seen such large machines, such heavy masses of steel being operated upon, such huge travelling cranes, while guns of all sizes are about him. In the presence of a 13-inch modern rifle the tendency is to keep silent. In the presence of many such monster guns, which shine like glass, and are far larger than the finished cannon, one is inspired with awe. The atmosphere of the place is in keeping with the feelings of the stranger, for scarcely any noise is heard, very few men are seen and the large and powerful machines seem to run themselves.

The north end of the shop is by far the most interesting, and to this every visitor to the works will turn. In this part of the shop is the 110-ton travelling crane, than which there is none more powerful in the country; eight massive lathes and an enormous rifling machine, all American creations. One of the lathes is 130 feet long and is designed to take a 16-inch gun, which is the largest and heaviest in existence, being 50 feet long and weighing 110 tons. Four others are capable of taking guns up to 14 inches caliber and differ from each other only in detail. In any one of them the gun can be bored or turned. In fact, they are so constructed and arranged that both operations can be carried on at the same time. All of them carry tool carriages and clamps for cutting tools, each operating independently. The other three lathes are large and are 68 feet long, but are not designed for boring, while each has sufficient capacity to turn the exterior of the largest gun of the navy—the 13-inch.

By far the most interesting machine in this interesting lot is the rifling machine, which is used to cut the spiral grooves in the interior of the bore that impart to the projectile a rotary motion. It can operate on the heaviest gun made, while there are features about its construction as accurate as an astronomical instrument. The rifling head, the creation of naval officers, is a marvel in design and workmanship and carries four cutters, each the counterpart of the other and operating simultaneously. This was a great advance in the operation of rifling big guns, for previously the rifling head had worked on one groove at a time. Turning from this wonderful group of machines, and the burdens, hardly less

interesting, which they carry, one sees near the center of the building the shrinking pits and furnaces where the operation of heating and assembling the parts of a built up gun takes place.

In the south end of the shop there is greater profusion of guns and material than in the north shop, and 40 lathes are in operation, guns being bored, turned and rifled, and while they would be very interesting in themselves, the disparity in size between the guns and machines in this shop and those in the north shop impresses one. All guns of 4 inches and up to and including those of 8 inches caliber are made here and comprise by far the greatest number of guns used in our main batteries. But these are as toys compared to the big 13-inch guns, for while the latter weigh 60 tons each, the 8-inch guns weigh only 15 tons. So it happens that the visitor will turn from this shop to the gun carriage shop, just beyond and to the westward.

In this building, which is very similar in size and outward appearance to the gun shop, every gun mount used in the navy is manufactured. As one enters the east door he finds himself in the center of a typical, thoroughly equipped machine shop, presenting a busier, if less interesting, scene than the great shop he has just quitted. In making his way around he will pass between and around almost every conceivable shape of metal castings, bracket plates, bronze cylinders, steel pistons and piston rods, large bronze, conical shaped stands and combinations of wheels, levers, worms, racks and pinions. These are in the rough form, in the smooth and in all intermediate stages. Together with the lazy little boring machines, the small, light running lathes, the steam drills, hammers, planers and all other machines and tools for light work, the material covers almost entirely the available floor space.

In the breech mechanism shop every machine, every tool, looks keen and delicate, while in the gun shop everything looked grand and heavy. Breech mechanism, as the name implies, is fitted in the breech of each gun, so that when the gun is fired there will be no possible escape of gases to the rear. Each and every part is made of the finest grade of steel, thoroughly tested before using, and must be made as accurate in every feature, all dimensions as true as the best electrical drills and other tools can make them. No work is more accurate than that of making and fitting a breech mechanism, for on it principally the safety of the gun depends. Slits and grooves, cogs and worm wheels, racks, pinions and levers are scientifically fitted. All breech closures in our naval guns are of the slotted screw system, and just here it is proper to note that all mechanisms for operating the breech plugs are the inventions of American naval officers.

Besides the shops mentioned, there is an erecting shop and power house, from which all power and electric lighting for the entire plant is supplied; pattern shops, a bronze foundry, chemical laboratories, testing machines, smithy, drafting rooms and offices, all complete and thoroughly equipped. The grounds cover an area of more than 40 acres, of which more than 20 acres is occupied by buildings, including officer's quarters, and about 12 acres by shops and offices.

### WORK ON THE GUN.

All modern high power guns are built up—that is, they are made up of many pieces, and the manner of assembling the parts has many interesting features. In machining the parts of a 13-inch gun a degree of accuracy is required in shaping, turning, boring and fitting found in no other work done by machines on large masses of metal. From the moment each piece is placed in the lathe until the last groove is cut the work must be done with the greatest care.

The gun proper consists of a long central steel cylinder, called the tube, on the breech end of which a large steel cylinder, called the jacket, is shrunk and a number of other cylinders, called hoops, shrunk on over all. In preparing the parts for assembling the tube is turned down to nearly accurate dimensions and bored out to accurate dimensions. At the same time the jacket is turned down to rough dimensions and bored out to accurate dimensions, the interior diameter of the latter being a little less than the true exterior diameter of the former. When the interior of the jacket is finished the tube is turned down to its exact exterior diameter. The reason for this is apparent. If the interior of the jacket, through any possible accident, should be bored too large, the tube could be turned to fit and the parts used without endangering the strength of the gun; whereas, if the tube were turned down too much, such would not be the case. To appreciate the accuracy of the machine work in gun construction it is only necessary to know that all the dimensions of the massive parts must be true to the one-thousandth part of an inch.

For the turning special calipers are made and rigidly set at the different dimensions by bringing the points into exact contact with each one of a set of steel rods, one corresponding to each different dimension, the length of each rod being determined

by a measuring machine, which is kept in a constant temperature. The interior of each piece is accurately gauged by a most accurate gauge, which is also treated with great care. When the tube and jacket are ready for assembling, or are prepared, rather, so far as the machine work is concerned, they are lifted from the lathes and deposited at the shrinking pit, where some of the most interesting details of gun construction are carried out.

### SHRINKING ON THE JACKET.

The jacket is placed in a vertical position in the center of a cylindrical fire brick furnace, where it is expanded. The brick furnace is enclosed in an iron cylinder with a large air space between, and a heavy iron cover fits over the top of both. A constant supply of air is forced into the bottom of the outer cylinder, where it comes into contact with burning petroleum, and the heated gases resulting from combustion circulate around the jacket and bring it gradually up to the proper temperature, which does not exceed 600 degrees. So gradual and equal must the expansion be and so particular are those in charge to avoid any possibility of particles of grit or foreign matter adhering to the metal that the products of combustion are not brought into contact with the jacket at all. It remains in the furnace about 30 hours before it reaches the proper degree of expansion, during which time the cover is occasionally lifted off, the cylinder gauged along its entire length and its temperature tested at different points by the application of strips of fusible metal.

In the meantime the tube is placed in a vertical position, muzzle down, in the shrinking pit, where it is firmly clamped. Above the clamps stand 17 feet of its length, bright and true, over which the jacket must be shrunk, while a hollow brass cylinder projects from the floor below through the center of the tube, through which there is a constant flow of water at an ordinary temperature. This, that the tube may be kept at the same temperature throughout and unaffected by the heat of the furnace, only a few feet away. So important is this that the slightest expansion of the tube, even the fraction of a thousandth of an inch, might be a serious matter. As the jacket approaches the proper degree of expansion it is watched constantly by the master mechanic.

Temperatures and dimensions are determined frequently and with great accuracy till, at the very moment the proper stage is reached, the master mechanic raises his hand, the giant crane moves and is halted directly over the furnace. The cover is quickly hauled out of place, the tackle hooked to a band around the jacket, the block begins to ascend and the large cylinder is soon suspended in midair. The master mechanic once more and for the last time gauges its interior, it is wiped off thoroughly, another signal and the crane moves a few feet south, bringing its burden directly over the piece it will soon encircle. Here it is accurately aligned and plumbed, one finger is raised by that careful man in charge, and guided by the asbestos padded hands of strong and perspiring mechanics the heavy load slowly descends. Not a word is spoken and the master mechanic never takes his eyes from the burning hot metal, but by the use of his fingers as signals regulates the descent of the jacket.

The accuracy with which it must be guided, its great weight and the rapidity with which the operation must be performed, combine to make the shrinking on of a 13-inch jacket a most delicate matter, and the strain on those in charge is intense during the 15 or 20 minutes that the jacket moves slowly into place. From the moment it is lifted from its position in the furnace it begins to lose heat and every minute counts. There is a clearance of only four-one-hundredths inch between the tube and the jacket, and the latter, hot and heavy as it is, must not be allowed to come into contact with the tube at any point, or at any rate any contact must be extremely slight and momentary. The slightest touch might form a burr that would cause the jacket to stick, resulting in endless trouble and expense, if not the loss of the value of the jacket in material and labor. Happily, this accident has happened only once, as far as I am able to ascertain, and then it was not a very serious one. In all other cases this operation has been a decided success, and usually the jacket is in place in 15 minutes after it is taken from the furnace.

The parts remain in the pit for 48 hours to cool, after which the combined tube and jacket are placed in one of the large lathes, where it is turned down to receive the hoops which are shrunk on the jacket and about two-thirds of the length of the tube not covered by the latter. Each hoop is heated and expanded and shrunk on while the unfinished gun is in a horizontal position, one of the large cranes doing the work, after which this enormous weapon is turned down to proper exterior dimensions and placed in the large rifling machine and the tube rifled.

The delicacy of this operation can be appreciated when one realizes that the piece to be operated upon



represents nearly \$100,000 worth of material and labor. The grooves must be cut just the proper depth and width and length, and a cut too deep or a cut too long, or any other mistake, may ruin the gun. But the machine is too perfect in its construction, too skillfully and thoroughly adjusted and too carefully watched and handled by the man operating it for any such accidents to occur, and after ten days or two weeks on the machine the rifling of the big gun is finished. From the rifling machine it is lifted on to a large flat car in the center of the building and run out into the yard, where it is deposited on blocks built up several feet high, a house built around it and the breech mechanism fitted, and the gun is complete. From the factory it is shipped down the Potomac River to the Indian Head proving grounds, where it undergoes many severe tests before being installed on board of one of our large ironclads.

This marvelous product of machine work has been more than six months in course of construction, and is worth complete \$100,000. It is 479.1 inches long, weighs 60.5 tons, fires a charge of 550 pounds of slow burning powder, a steel projectile weighing 1100 pounds, thrown with a velocity of 2100 feet per second and developing a muzzle energy of 33,627 foot tons, or 74,000,000 foot pounds, and is capable of piercing 24.54 inches of solid steel at a distance of 1000 yards from the muzzle. The plant, while just ten years old, has sufficient capacity to more than supply the demands for the growing naval armaments, is worth, including an estimated value of grounds and all buildings, nearly \$4,000,000, and has an annual output of about \$1,500,000. As a gun factory it is thoroughly equipped and the products of its manufacture are equal in material, workmanship, strength and endurance to any gun in the world. As a business enterprise it is a decided success, and is a most positive proof that the United States Government can operate a large enterprise on business principles, when under the direction and supervision of men who are prompted by ambition and a desire to excel.

#### Books and Magazines.

**TODD'S NEW ASTRONOMY.** By David P. Todd, M. A., Ph. D., Professor of Astronomy and Director of the Observatory, Amherst College. Cloth, 12mo, 500 pages. Illustrated. Price, \$1.30. American Book Company, New York, Cincinnati and Chicago.

This new astronomy is designed to meet the present requirements of schools and students for a practical and scientific text-book in this important and most interesting study. Of the author's ability to write an ideal work on the subject, which should be at once simple, scientific, practical, and interesting, there can be no question. In addition to his former work in the United States Astronomical Observatory at Washington, and as Director in the Amherst College Observatory, he is well known to the public as leader of two solar eclipse expeditions, under the auspices of the United States Government, one to the west coast of Africa, and one to Japan, and as leader of another astronomical expedition to Japan, organized by Amherst College.

By placing more importance on the physical than on the mathematical facts of astronomy, the author has made every page of the book deeply interesting to the student and general reader. While mathematical results are given, the beauty and interest of the study are not obscured by unnecessary mathematical processes. Questions of universal interest, such as "Where does the day change?" "Where will the sun be overhead at noon?" "Where does the Southern Cross become visible?" "What are meteors?" "What is the difference between the sidereal and the solar day?" etc., receive special attention in the treatment.

The illustrations are an important feature of the book. Many of them are so ingeniously devised that they explain at a glance what pages of mere description could not make clear.

\* \* \*

"A Mile of Gold, or Strange Adventures on the Yukon," proves once more, how true it is that "truth is stranger than fiction." It tells, in simple, modest language, of the torments, dangers and privations courageously endured by its author, William M. Stanley, of Seattle, one of the discoverers and happy possessors of the new El Dorado. For the first time the public is given a knowledge of the inside life of the gold hunter, and this is as thrilling reading matter as any romance ever published. Well illustrated with views taken on the spot. (Laird & Lee, Chicago. Extra board cover, 50c.; paper cover, 25c.)

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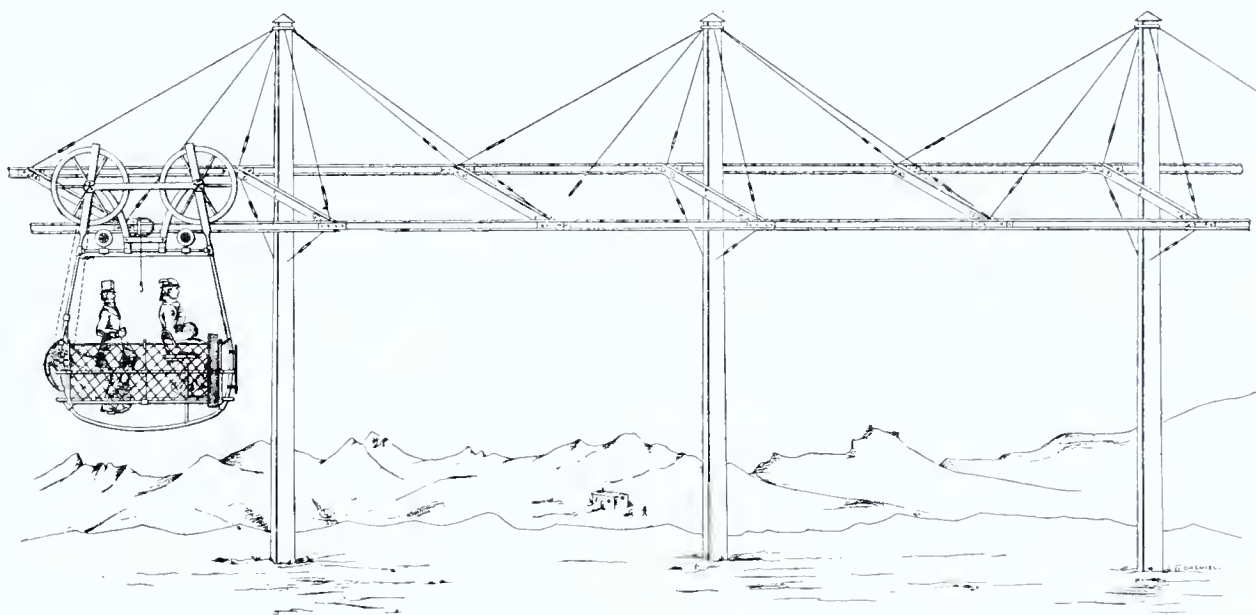
The mystery in "The Unseen Hand," by Lawrence L. Lynch, is so well hidden as to keep the reader in suspense to the last page and in such a way as to excite intense curiosity without resorting to vulgar sensational means. A brilliant story of entrancing interest. Price: Board covers, 50c.; Paper covers, 25c. Laird & Lee, Publishers, Chicago.

#### Elevated Track and Cycle.

Some time ago Mr. William H. Martin, of Mobile, Alabama, patented an invention for an elevated track cycle, in which were many things to recommend it to public favor. Since then improvements have been made, and now Mr. Martin has a system of track and machine arrangement that is not only unique, but is also of practical value and interest.

In this invention there is a carriage suspended from a frame, to which are attached two wheels with grooved peripheries, arranged one before the other, to run upon the overhead track. The latter is double, having the rails laid upon and at the ends of transverse supports, arranged near the top of the poles and strengthened by rod-braces. The whole apparatus is nicely balanced, and is made additionally secure by two small grooved wheels connected with the swinging frame and engaging the under side of the rail, thus making it impossible for the wheels to jump from the track.

In the passenger carriage are located the wheel and sprocket gearing to be operated by foot power, and the usual bicycle saddle for the operator's use. A chain connects the foot-sprocket with another situated at the back of the carriage, and from the latter (sprocket) extends a long chain engaging with its upper loop the hub of the rear upper rail-wheel. The carriage is attached at its ends to a

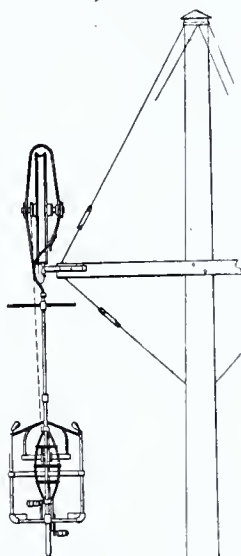


PLAN OF THE MARTIN ELEVATED TRACK AND CYCLE.

U-shaped rod, the upper ends of which extend upward and over the large wheels, being united at their hubs by a horizontal bar which holds them rigidly in position.

The frame part of the carriage extends down beneath the track about six feet; it has two light bar straps running around it except at the gate entrance where a folding gate is provided. The bottom of the carriage will swing seven feet from the ground, just high enough to miss the heads of the pedestrians. When running through streets or over roadways higher poles will be required.

With foot power (which will be employed for the first road of this kind to be built at Mobile, Ala.),



END VIEW.

this elevated track cycle can be driven at the rate of fifty miles an hour. But with electricity or gasoline (either can be used with suitable apparatus) a speed of 100 miles an hour can be obtained.

This cycle is particularly adapted for suburban travel to pleasure resorts, etc., and would afford a rapid, easy and pleasurable means for a short outing. It presents attractive features for a cold climate where much snow affects the operation of

surface roads. The capacity for one car is for six people, but by using trains of cars—which can be easily attached—any number desired can be whisked through the air, providing sufficient motive force is used. The estimated capacity for a four-horse gasoline engine is fifty or sixty passengers. It will cost to build a double track road of the kind about \$1,500 per mile, and the cars for same, from \$20 to \$25 each.

From a standpoint of safety, there is little danger to be feared. When in operation, the cars will, when loaded, have a weight of not more than 800 pounds each, while the capacity of the rail support is about 6,000 pounds. Negotiations for constructing roads of this kind are now on foot in several large cities, and the inventor of the "new flier" is open for agents in all towns and cities of the United States, who will get up stock companies and push the matter in a thoroughly business manner. A letter from a couple of well known government engineers appears in another column in which the merits of this elevated cycle system are scientifically set forth.

Additional patents covering important details of construction and improvements in the system will shortly issue to Mr. Martin and patents in ten of the leading foreign countries have been applied for.

In order to check the continual resignations of members of the examining force in the U. S. Patent Office to engage in private patent practice Assistant

Commissioner Greeley sees a remedy in higher salaries to efficient men. These constant resignations cripple the service of the bureau, as frequently the most efficient and experienced officials are among those who find it profitable, or at least advisable, to leave the government service and enter into private patent business.

#### Compressed Flour.

The British Admiralty and the War Department are testing, under various climatic conditions, the new method for preserving flour. One objection to the establishment of national granaries has been the difficulty of storing grain for any length of time. The grain germinates and is ruined, and to keep large quantities in sound condition has been pronounced impracticable. Experiments are being made with a system of compression into bricks by hydraulic pressure. The trials show that the flour so treated is not affected by damp, even under unfavorable conditions, and is free from mould. The compression destroys all forms of larval life and the flour is thus rendered safe from the attacks of the insects. The saving in storage is enormous, as the cubic space occupied by 100 pounds of loose flour will hold more than 300 pounds of the compressed article.—*Scientific American*.

Norris Peters Co., the well known Washington photo-lithographers, and contractors for publishing the Official Patent Office Gazette, are out with the third edition of a little booklet containing full information relating to drawings to accompany applications for patents in all the principal countries. This is an indispensable little work for patent solicitors and can be had for the asking. The Norris Peters Co., keep posted regarding changes in patent laws, and rules and regulations of foreign patent offices and this work is a compilation of the latest requirements in relation to drawings, etc., of all countries. Patent attorneys will readily understand the value of an up-to-date publication of this kind.



## Procedure of the Official Examiner.

BY SEMER G. WELLS.

In the November number of the *INVENTIVE AGE* appeared an "Open Letter from an Inventor to Patent Solicitors," which I have carefully read.

In the same number Examiner Frederick W. Winter replies to "Inventor," from the standpoint of an official examiner.

Now, I beg to submit a reply, from a standpoint of a patent solicitor. To start with "Inventor" says:

"Now that the office 'register' for attorneys is secured, and unfair and incompetent competition guarded against, it would be well for the attorneys to do something towards getting Patent Office Rules modified in the interest of their clients."

It is my judgment that if the attorneys would do more towards learning what the Patent Office Rules are and towards complying with those rules, no one of those attorneys would have "over five hundred applications finally rejected in two years." The principal errors in the Patent Office rules are on the side of leniency towards incompetent attorneys.

Again Inventor says:

"But the office practice is even worse than its rules. The examiners seem to do about as they please, regardless of both the law and the rules. For an example take the 'final rejection' system, which the office has gradually built up for its own convenience, to 'hurry up the work,' regardless of the rights and interests of inventors and their attorneys."

If it were not for the "final rejection" system the office would be six years behind in its work instead of considerably less than six months. Again "Inventor" says:

"Attorneys who prosecute cases by personal interviews with the examiners may not object so strongly to the above practice, but all who do business by correspondence most certainly will, because the examiner's second rejection will be called 'final,' which practically shuts them out from the privilege of really 'prosecuting' the case at all."

I do not believe that it is true that attorneys who prosecute cases by personal interviews with the examiner, have an advantage over those who do their work by correspondence. In fact I am inclined to the contrary belief. It certainly is not true "that all who do business by correspondence most certainly will," object to the practice. The most serious charge made by "Inventor" is contained in the following quotation from his letter:

"As everybody knows, the first rejection is hastily made, as a sort of fishing excursion in search of some reference showing at least a faint or distant resemblance to the invention being examined. The examiner guesses at it, and the attorney does the real work of the examination. That could be borne, however, if the examiner would fairly consider the carefully and laboriously prepared explanations and arguments sent in, and act according to the facts, either finding a better reference or allowing the claims."

"But under the present system he will not change his decision, however wrong it may be. The references may not be pertinent, the reasons and objections are plainly not in accordance with the facts; but no matter what the attorney says or does, the examiner will not move from his position. He simply 'repeats' his action and previous rejection, thus putting the case under 'final rejection,' and getting rid of it with one examination."

"The injury of this system is felt by substantially all applicants for patents, because the system is generally followed. Everything is sacrificed to speed the work. If the attorney cuts out the rejected claims, he gets an inferior or worthless patent; if he does not cancel them, he loses the whole invention, by so-called 'abandonment.' Thousands of cases are lost in that way every year. They are called abandoned, but they are really killed. One attorney alone has had over 500 applications 'finally rejected' in two years, and every attorney has more or less of such cases. They are 'finally rejected,' not because they are not patentable, but because the examiners want to close the examination and hurry up their work, and would not consider any further amendments, arguments or actions."

I have prepared and prosecuted about one thousand applications. In the beginning I had a fairly good legal education and some mechanical ability and experience, but I knew nothing about the practice of the patent office. As a natural consequence

I have made all kinds of bad breaks. I have been before all the tribunals of the office upon all kinds of questions, and I desire to state to "Inventor," and his class, that I have always received careful attention and consideration at the hands of the officials of the office, including the primary examiners, the board of examiners-in-chief, the examiner of interferences, the Commissioner and the clerks. I have had a few cases "finally rejected," but I can recall but two or three of the rejected cases which in my judgment should have been allowed, and, in these cases, I was compelled to concede that the law and the practice was against me.

"Inventor's" language sounds to me very much like that of a disgruntled attorney who has had "500 applications finally rejected in two years." It is not true that the first examination of a case is hastily made, and it is not true that the examiners are arbitrary and stubborn and will not recede from a position which they have once taken.

As an example: I prepared a complicated case having four sheets of drawings, twenty pages of specification and nineteen claims, with a full knowledge of the state of the art. The case was allowed without amendment. In regard to this matter it was suggested to me that that examiner would allow anything. Shortly afterwards I prepared another case with one sheet of drawings, five or six pages of specification and seven or eight claims and it went before the same examiner, who was supposed to allow anything. The examiner's first action tore the specification all to pieces, pointed out defects in the drawings, which made it necessary to make the drawings over, and rejected every claim upon references. I have reason to know that the two actions were made by the same man. The difference simply was that I carefully revised the first case with a full knowledge of the state of the art, before filing it, and I did not revise the second case and had no knowledge of the state of the art. This simply shows that the examiners discriminate between good work and poor work, and in order to do this it is necessary for them to carefully examine the work.

In another case I carefully prepared the drawings and specification and spent considerable time in framing what I considered proper claims. The examiner made no objection to the drawing and specification but rejected the claims upon references. I examined the drawings of the references causally, concluded that the examiner's action was correct and limited the claims. The limited claims were rejected and the examiner called for division. I made another drawing and divided the case and still further limited the claims. The last claims were objected to, in language and construction, and I again amended, placing the case in condition for allowance, as suggested by the examiner. Instead of a notice of allowance, the examiner took the case up again, changed his former action and called for further amendment. I began to get out of patience, and, for some reason or another, decided to examine the specifications of the references. Then I discovered that the references were not pertinent. I went back at the examiner, pointed out the fact to him that the references were not pertinent, restored the drawing and specification to its former condition, cancelled the limited and rejected claims, inserted broad claims, and then the case was allowed and passed to issue. This shows that examiners will recede from their positions when the attorney does his duty and shows the examiner where he is wrong.

I assisted in the preparation and prosecution of a case in which there were fourteen sheets of drawings, eighty pages of specification and eighty-seven claims. The examiner's first action in this case covered between thirty and forty pages and called for a thirty page amendment. It began with the first page of the specification, made objection, in detail, to almost every page of the specification, made a detailed examination of every one of the eighty-seven claims, and called for reconstruction of the drawings. This case was well prepared and the examiner's letter contained but one error so far as

I could find. The claims were not rejected en masse upon specific references, one at a time, there being something like seventy-five references cited.

This shows that the examiners do examine the cases. If this case had been examined according to "Inventor's" idea, one or two pages would have contained the examiner's action.

I have successfully prosecuted cases in every division of the office and I have not found the slightest foundation for any of "Inventor's" strictures or charges. On the other hand, I have found that, where cases are carefully prepared and carefully prosecuted, there is no trouble in getting claims allowed which are commensurate with the state of the art. On the contrary the office is more inclined to err on the side of liberality.

I consider the present force of examiners to be a body of men remarkably well qualified for their positions. They seem to be industrious, scholarly and fair minded, and when an attorney succeeds in having "500 cases 'finally rejected' in two years," there is something radically wrong with that attorney. He is either grossly incompetent or grossly dishonest. The competent and honorable attorneys, who are practicing before the office, would not have five hundred cases "finally rejected" in fifty years, even if they had all the work they could possibly do.

It seems to be "Inventor's" idea that the attorneys who comply with the rules of practice, and who are not constantly kicking and trying to change the rules, are unfaithful to their clients. It seems to me that the true ideal of fidelity to clients is for the attorney to study and find out what the rules of practice are, and then to comply with those rules. It is the attorneys and lawyers who are out of harmony with the tribunals before which they practice who are always losing their cases. The attorney who understands the law and rules and aims to comply with them, has no trouble in any tribunal, and this is especially true of the patent office.

When inventors learn to intrust their work to attorneys who have made a study of mechanics and law, and who are honest and studious, they will have no trouble in obtaining justice in the patent office, as at present constituted. While there is a chance for improvement, I think, in some details of the practice, still the United States has the best patent system which has ever been devised, and the work is in the hands of competent and conscientious men. The sooner the attorneys who are out of harmony with the system and who have "over 500 applications finally rejected in two years" get out of the business the better it will be for the inventors.

## Extension of American Trade Abroad.

In a recent interview William W. Allis, president of the great steam engine works at Milwaukee, gives utterance to some interesting facts illustrative of the wonderful extension of American trade abroad. He says:

"We are just now making machinery for the underground railway in London. Besides this we are filling orders for engines for the electric railways or tramways in Edinburgh, Scotland; Dublin, Ireland; Madrid and Barcelona, Spain, and Sydney, Australia. They have come to recognize in England and elsewhere that we are far advanced in the making of machinery and they come to us to get it."

"Recently we received a visit from a special representative of the South African Consolidated Gold Fields, who has placed with us an order for more machinery. That concern is perhaps, the wealthiest and most successful gold concern in the world, whose stock, now worth some \$500,000, has advanced 1000 per cent since the Company was first founded. The mines are located in the same field where the late Barney Bernato made his fortune. We have furnished them so far about \$1,000,000 of machinery, and are to furnish them a great deal more."

"At Edinburgh, Dublin, Madrid and Barcelona, where we are furnishing tramway power machinery, the contracts amount to about \$500,000 in each. Our contract for equipping the tramway at Sydney is with the Australian Government, and amounts to considerably more. Aside from this we have recently secured a contract for supplying blowing machinery for steel works at Trieste, Austria, without even any competition."



### The Wheel Of Human Progress.

In a recent sermon on the progress of the world Dr. Talmage eulogized the wheel as applied to machinery. Taking for his text Ezekiel x: 13:—"As for the wheels, it was cried unto them in my hearing, O, wheel!"—he said, in greater part:

"First in domestic life the wheel has wrought revolution. Behold the sewing machine! It has shattered the house-wife's bondage, and prolonged woman's life, and added immeasurable advantage. The needle for ages had punctured the eyes, and pierced the side, and made terrible massacre. To prepare the garments of a whole household in the spring for summer, and in the autumn for winter, was an exhausting process. 'Stitch! stitch! stitch!' Thomas Hood set it to poetry, but millions of people have found it agonizing prose. Slain by the sword, we buried the hero with the 'Dead March in Saul' and flags at half mast. Slain by the needle, no one knew it but the household that watched her health giving way. The winter after that the children were ragged and cold and hungry, or in the almshouse. The hand that wielded the needle had forgotten its cunning. Soul and body had parted at the seam. The thimble had dropped from the palsied finger. The thread of life had snapped and let a suffering human being drop into the grave. The spool was all unwound. Her sepulchre was digged, not with the sexton's spade, but with a sharper and shorter implement—a needle. Federal and Confederate dead have ornamented graves at Arlington, but it will take the archangel's trumpet to find the million graves of the vaster army of women needle slain. Besides all the sewing done for the household at home, there are in our cities uncounted thousands of sewing women. The tragedy of the needle is the tragedy of hunger, and cold, and insult, and homesickness, and suicide—five acts.

#### WHAT THE SEWING MACHINE HAS DONE.

"But I hear the rush of a wheel. Woman puts on the band and adjusts the instrument, puts her foot on the treadle and begins. Before the whirr and rattle, plourisies, consumption, headaches, backaches, heartaches are routed. The needle, once an oppressive tyrant, becomes a cheerful slave. Roll and rumble and roar until the family wardrobe is gathered, and winter is defied, and summer is welcomed, and the ardors and severities of the seasons are overcome. Winding the bobbin, threading the shuttle, tucking, quilting, ruffling, cording, embroidering, underbrading, set to music. Lockstitch, twisted loop-stitch, crochet-stitch, a fascinating ingenuity. All honor to the memory of Alsop, and Duncan, and Greenough, and Singer, and Wilson, and Grover, and Wilcox, for their efforts to emancipate woman from the slavery of toil! But more than that, let there be monumental commemoration of Elias Howe, the inventor of the first complete sewing machine. What it has saved of sweat and tears, God only can estimate. In the making of mens and boys clothing in New York City in one year it saved \$7,500,000; and in Massachusetts, in making of boots and shoes, in one year it saved \$7,000,000. No wonder that at some of the learned institutions, like the New Jersey State Normal School, and Rutgers Female Institute, and Elmira Female College, acquaintance with the sewing machine is a requisition, a young lady not being considered educated until she understands it. When winter is coming on, and the household must be warmly clad, the 'Last Rose of Summer' will sound better played on a sewing machine than on a piano. Roll on, O wheel of the sewing machine! until the last shackled woman of toil shall be emancipated. Roll on.

#### IN THE AGRICULTURAL WORLD.

"Secondly, I look into the agricultural world to see what the wheel has accomplished. Here are stalks of wheat and oats; the one bread for man, the other bread for horses. Coat off, and with a cradle made out of five or six fingers of wood and one of sharp steel, the harvester went across the field, stroke after stroke, perspiration rolling down forehead and cheek and chest, head blistered by the consuming sun, and lip parched by the merciless August air. At noon the workman lying half dead under the trees. One of my most painful boyhood memories is that of my father in harvest time reeling from exhaustion over the doorstep, too tired to eat, pale and fainting as he sat down. The grain brought to the barn, the sheaves were unbound and spread on a thrashing-floor, and two men with flails stood opposite each other hour after hour and day after day, pounding the wheat out of the stalk. Two strokes, and then cessation of sound; Thump, thump! thump, thump! thump, thump! Pounded on one side, and then turned over to be pounded again. Slow, very slow. The hens cackled and clucked by the door, and picked up loose grains, and the horses, half asleep and dozing over the mangers where the hay had been. But hark! to the buzz of the wheels in the distance! The farmer has taken his throne on a reaper. He once walked; now he rides. Once worked with arm of flesh; now with

arm of iron. He starts at the end of the wheat field, heads his horses to the opposite end of the field, and rides on. At the stroke of his iron chariot the gold of the grain is surrendered, the machine rolling this way and rolling that, this way and that, until the work which would have been accomplished in many days is accomplished in a few hours. The grain field prostrate before the harvesters! What quick, clean work the wheel of the reaper does make! Soon after, the horses are fastened to the thrashing machine, back of the barn. The iron-toothed cylinders are ready for their prey. The horses start, the unbound wheat is plunged into the vortex, and the broken straw is in one place and the pure Missouri wheat is in another place. The driving-wheel strapped, the cylinder humming with terrible velocity, the inexperienced warned off for fear of accident, the ground aquake with the mighty revolution, I stand in awe and thanksgiving at the agricultural conquest, and cry out with the text, 'O wheel!'

#### THANKS TO A YANKEE.

"Can you imagine anything more beautiful than this cotton? I hold the unmelted snow in my hand. How beautiful it is! But do you know by what pains-taking and tedious toil it passed into anything like practicability? If you examined that specimen you would find it full of seeds. It was a severe process by which the seed was to be extracted from the fiber. Vast populations were leaving the south because they could not make any living out of this product. One pound of green seed cotton was all that a man could prepare in one day; but Eli Whitney, a Massachusetts Yankee, woke up, got a handful of cotton, and went to constructing a wheel for the parting of the fibre and the seed. Teeth on cylinders, brushes on cylinders, wheels on wheels. South Carolina gave him \$50,000 for his invention, and instead of one man taking a whole day to prepare a pound of cotton for the market, now he may prepare 300 weight, and the south is enriched, and the commerce of the world is revolutionized, and over 4,000,000 bales of cotton were prepared in an ordinary year, keeping at work in this country 7,132,000 spindles, employing 135,000 hands, and enlisting \$140,706,000 of capital.

"Thank you, Eli Whitney, and L. S. Chichester, of New York, his successor. Above all, thank God for their inventive genius, that has done so much for the prosperity of the world. When I see coming forth from this cotton production and cotton manufacture enough cloth to cover the tables of a nation, and enough spool-thread to sew every rent garment, and enough hosiery to warm the nation's feet, and enough cordage to fly the sails of all the shipping, and enough wadding to supply the guns of all the American sportsmen, and enough twine to fly all the kites outside of Wall street, and enough tape to tie up all the briefs of all the attorneys, and enough flannels to blanket a slumbering world, I thank God. For the \$50,000 received for his cotton gin Eli Whitney gave a wealth that makes the word 'millions' imbecile. Strange that one machine should work such marvels. Have you noticed the construction of the cotton gin? On one side of it I count three wheels, and on another side I count three wheels, while on the third side there is a wheel on the top of a wheel, and the salutation of the text bursts from my lips, while I cry in ecstasy and admiration and gratitude, 'O wheel!'

#### SUFFERING OF INVENTORS.

"Thirdly, I look to see what the wheel has done for the traveling world. No one can tell how many noble and self-sacrificing inventors have been crushed between the coach wheel and the modern locomotive, between the paddle and the ocean steamer, between the canal boat and the bicycle. I will not enter into the controversy as to whether John Fitch, or Robert Fulton, or Thomas Somerset was the inventor of the steam engine. They all suffered and were martyrs of the wheel, and they shall be honored. John Fitch wrote: 'The 21st of January, 1743, was the fatal time of bringing me into existence. I know of nothing so perplexing and vexatious to a man of feeling as a turbulent wife and steamboat building. I experienced the former and quit in season, and had I been in my right senses I should undoubtedly have treated the latter in the same manner; but for one man to be teased with both, he must be looked upon as the most unfortunate man in the world.' Surely John Fitch was in a bad predicament. If the steamboat boiler did not blow him up, his wife would! In all ages there are those to prophesy the failure of any useful invention. You do not know what the inventors of the day suffer. When it was proposed to light London with gas Sir Humphrey Davy, the great philosopher, said that he should as soon think of cutting a slice from the moon and setting it upon a pole to light the city. Through all abuse and caricature Fitch and Fulton went until yonder the wheel is in motion, and the Clermont, the first steamboat, is going up the North River, running the distance—hold your breath while I tell you—from New York to Albany in thirty-two hours. But

the steamboat wheel multiplied its velocities and the St. Louis, of the American line, and the Lucania, of the Cunard line, and the Majestic, of the White Star line, and the Kaiser Wilhelm, of the North German-Lloyd line, have crossed the Atlantic in less than six days.

#### WHEELS OF THE PRINTING PRESS.

"Again, I look into the literary world and see what the wheel has accomplished. I am more wonder struck with this than with anything else that has preceded. Behold the printing press! Do you not feel the ground shake with the machinery of the great daily newspapers of America? Some of us remember when the hand ink-roller was run over the cylinder, and by great haste 800 copies of the village newspaper were issued in one day and no lives lost. But invention has crowded invention and wheel jostled wheel, stereotyping and electrotyping, taking their places. 'Benjamin Franklin's Press' giving way to the 'Lord Stanhope Press' and the 'Washington Press,' and the 'Victory Press,' and the 'Hoe Perfecting Press,' until now, so an experienced friend informs me, the Mergenthaler type-setting machine can do the work of six compositors, and with a right arrangement of these presses 96,000 copies of an eight-page paper are turned out in an hour. I was told in one of the newspaper offices of Boston that they printed every day 100 miles of paper. It will take more brain than you and I will ever have to fully appreciate the literary, political, and moral statistics that there are now in the United States 19,861 newspapers. To what other wheel is the world more indebted than to this wheel?

"On those four wheels—that of the sewing machine, that of the reaper, that of swift travel, that of the printing press—the world has moved up to its present prosperity.

#### BOND BETWEEN NORTH AND SOUTH.

"I call on you to thank God for the triumphs of machinery as seen in our home comforts and added national grandeur. To this platform today we have brought specimens of the chief products of the nation. This speaker's stand is made of two sheaves, a sheaf of northern wheat and a sheaf of southern rice, bound together. May the band never break! I look around me and it seems as if the waves of agricultural and pomological wealth had dashed to the platform. And there are four beautiful beings that walk in, and they are all garlanded. One is garlanded with wheat and blossoms of snow, and I find she is the north, and another comes in, and her brow is garlanded with rice and blossoms of magnolia, and I find she is the south, and another comes in, and I find she is garlanded with seaweed and blossoms of spray, and I find she is the east, and another comes in, garlanded with silk of corn and apple blossoms, and I find she is the west, and, coming face to face, they take off their garlands, and they twist them together in something that looks like a wreath, but is really a wheel, the wheel of national prosperity, and I say, in an outburst of thanksgiving joy for what God has done for the north and south and east and west, 'O wheel!'. At different times in Europe they have tried to get a congress of Kings at Berlin, or at Paris, or at St. Petersburg, but it has always been a partial or complete failure, for only a few Kings ever came; but on this platform today we have a convention of all the Kings—King Corn, King Cotton, King Rice, King Wheat, King Oats, King Fruit—and they all bow before the King of Kings, to whom be all the glory of this year's bountiful production.

#### De Laval's Famous Boiler.

Descriptions appear in all the technical papers abroad of De Laval's famous boiler, which attracted so much attention at the Stockholm Exhibition—a boiler carrying 3,000 pounds pressure to the square inch, or ten-fold the maximum heretofore allowed—thus, as it is set forth, wonderfully enhancing the capacity of and eliminating the danger from steam; for, should the steam tubes burst from a pressure in excess of 3,000 pounds, the steam escapes harmlessly into the chimney flues. According to the details given of De Laval's invention the boiler is only a concentric spiral tube, less than an inch in diameter, through which the water is pumped, escaping a quarter of a mile from the starting point as steam, which turns a turbine wheel that propels the machinery. The coal in the furnace is kept automatically at the proper thickness to produce the most perfect and equable combustion; the necessary air is supplied by a fan, the water supply is automatically regulated, and, by means of an apparatus regulated by the steam pressure and acting on the valves of the blast, the combustion is controlled by the quantity of steam consumed. The boiler occupies very little space and so perfect is the combustion that a small sheet iron pipe takes the place of the smokestack. The steam is admitted direct from the steam pipes to the nozzles, where it expands.—*Age of Steel.*



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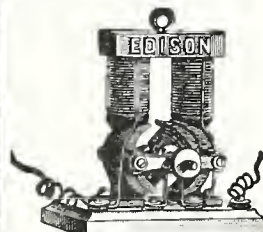
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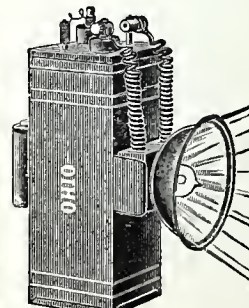
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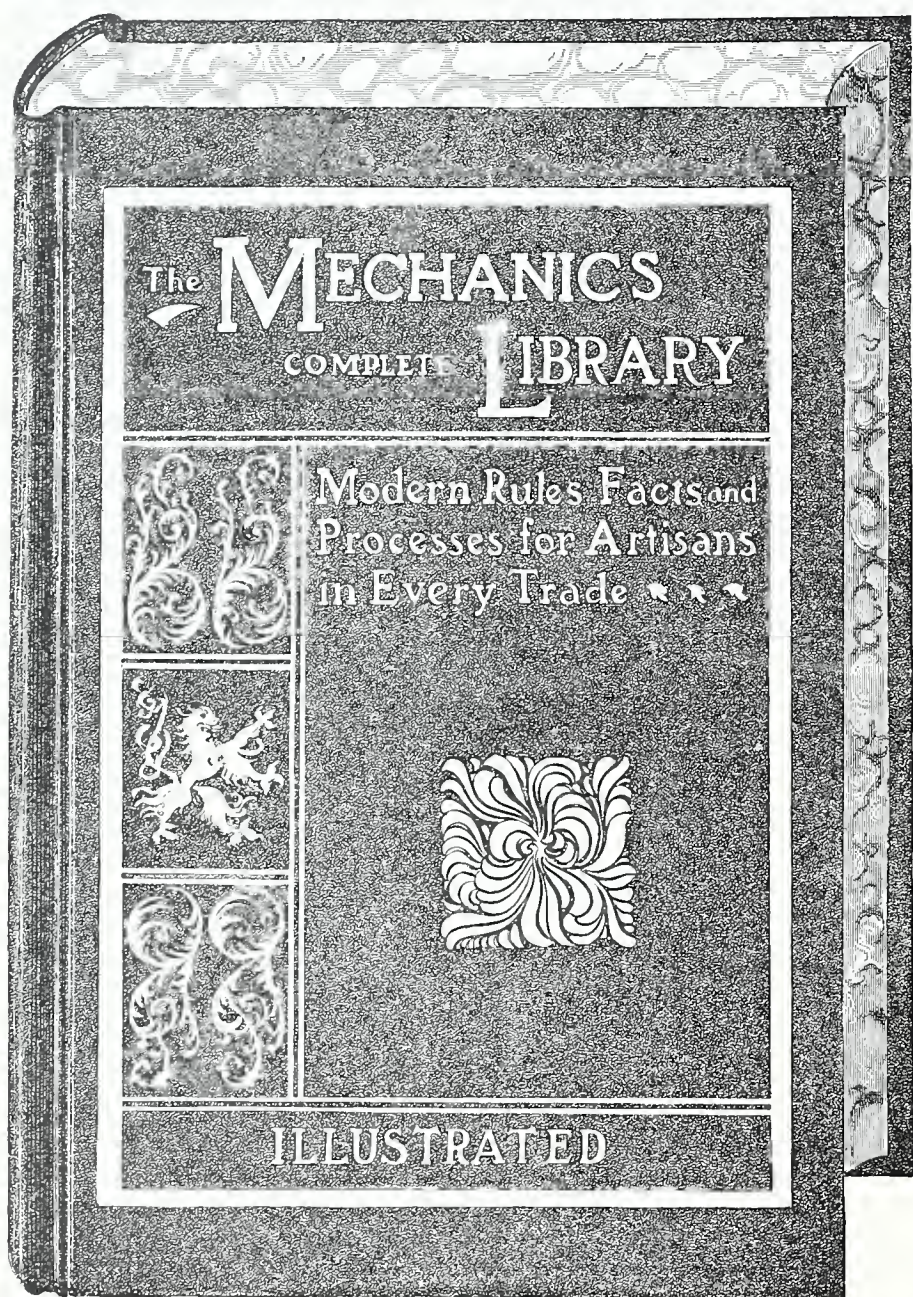
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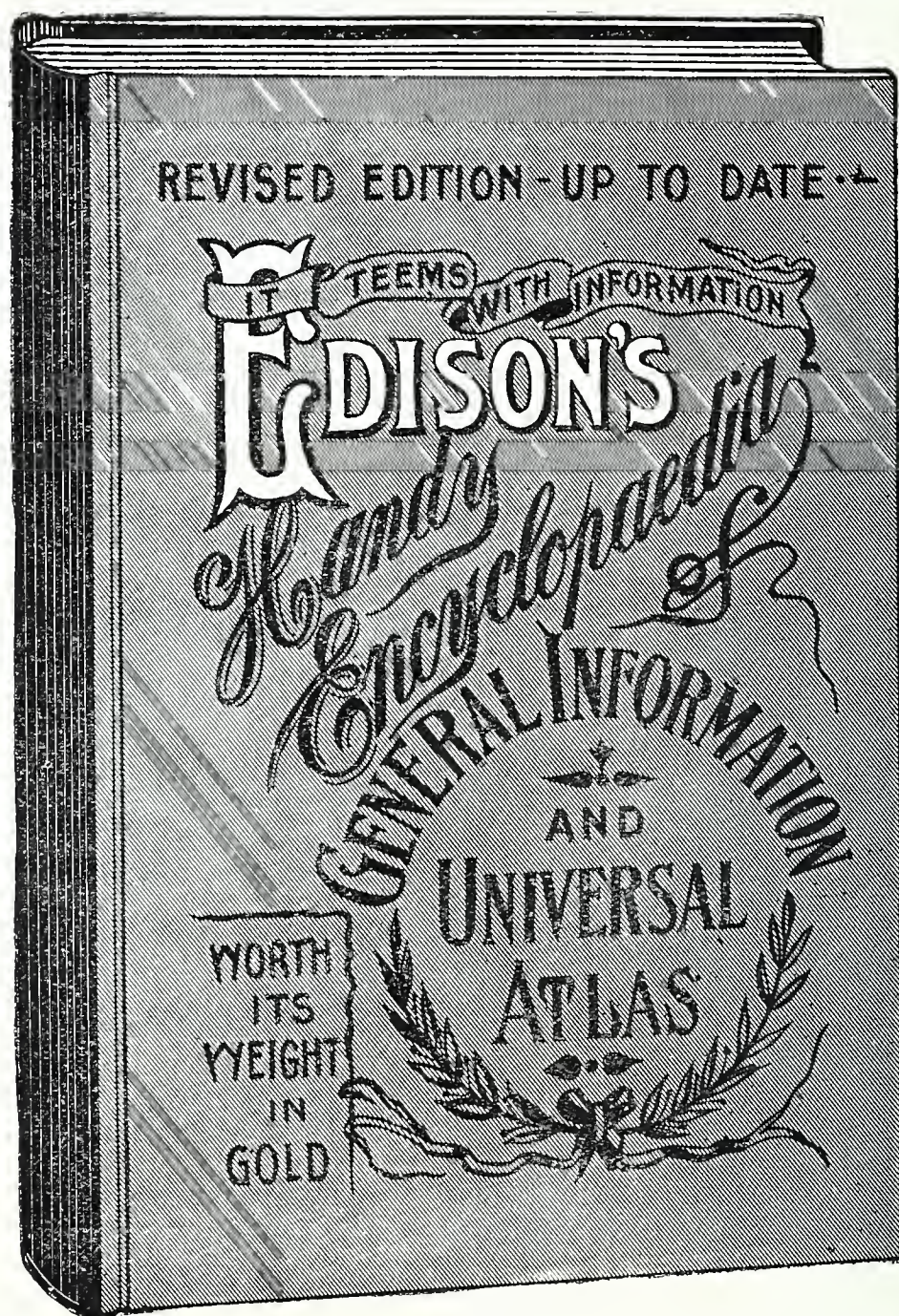
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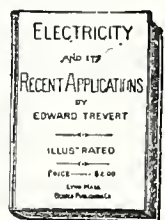
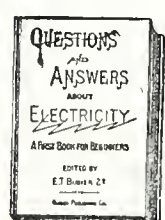
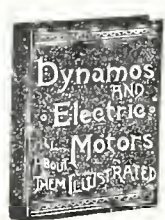
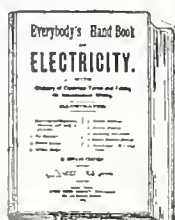
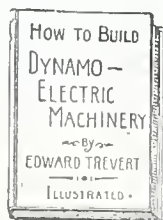
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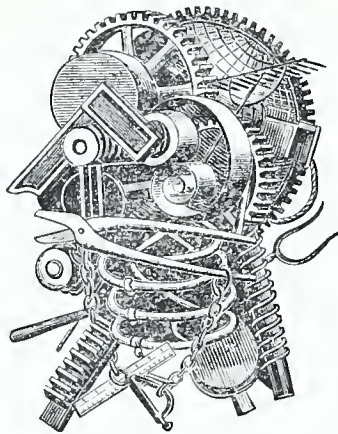
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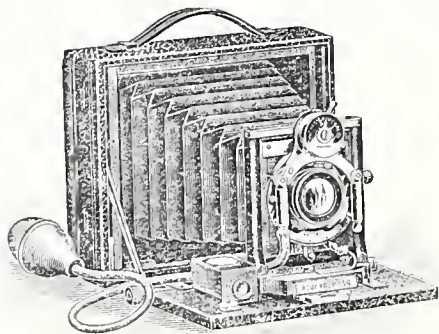
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# The Inventive Age

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### The Ill-Fated Maine and the "Infernal Machine."

In all the history of the torpedo and submarine mine—the most terrible engines of war—there is not a solitary instance where its tremendous effects have been made manifest, as in the awful catastrophe in which the lives of 253 men and a magnificent battleship were destroyed by one fell swoop of destruction if—and such seems to be the fact—the Maine was destroyed by this means.

There have been greater marine disasters, but none attendant with such tragic and national effect. The "Royal George," while lying at anchor, through carelessness, was careened over until the water running into her lee-ports, caused this great, old vessel to go to the bottom carrying with

powerful appearance in aggressive and defensive ability. She was—though considered a second-class battleship—an armored cruiser, but was one of the most efficient ships in the navy. She was 318 feet long, with a beam of 57 feet, and drew 22½ feet; her displacement was 6,682 tons; coal supply 400 tons, and bunker capacity, 896 tons. Her twin engines were equal to 9,293 horse-power, from which a speed of 17.4 knots was obtained.

For armor the "Maine" carried a belt 12 inches thick, and a protective deck from 2 to 4 inches thick. Her armament consisted of four 10-inch guns, contained in two turrets from 10 to 12 inches thick; six 6-inch guns, eight 6-pounder guns, the same number of 1-pounders, and four machine guns.

decks and furnishings were on fire, there were scenes and sounds that can never be described. No pen, nor brush can ever picture to any degree the ghastliness that was on every side of us. From everywhere came the cries and groans of the wounded and dying. Here could be heard a dying man cursing the black Spaniards, there a poor boy moaning his mother's name; yonder, and all about, were cries for help. Three men climbed the "Maine's" mast and were there roasted alive. Men could be seen sitting, lying upon and hanging to pieces of hot steel, unable to move and slowly burning to death. Bodies without arms, legs and arms without bodies; one body with another one's arm driven through its chest could be seen in the water; some of the men still struggling and some quietly sinking."

As to the nature of the explosion, the article



VIEW OF THE ILL-FATED BATTLESHIP MAINE IN HAVANA HARBOR—PHOTOGRAPH TAKEN THE DAY FOLLOWING THE DISASTER.

her 800 men and officers; the "Victoria," a modern British warship, turned over and sank, after colliding with the Camperdown, and took to their doom 359 officers and men; the Spanish ship "Oriflamme," in the sixteenth century, was found drifting at sea with every man on board of her dead; and the "Fulton II," the first steam warship—the "Arctic" and the "Princess Alice," were also lost amidst tragic surroundings.

These are a few of the many awful happenings on the water. But the hand of the Destroyer smote them not with such heart-rending and gruesome consequences as attended the disaster by the shores of the Queen of Antilles.

As the "Maine" lay quietly at anchor in Havana harbor, for the protection of American citizens and their interests in Cuba, she presented a

Her torpedo outfit consisted of seven torpedo discharge tubes, and two torpedo boats. The officers and men of this splendidly equipped ship numbered altogether 354.

From all the evidence so far accessible, it appears that this noble war vessel was blown up by an exterior force and if this is correct, then the work was done by a submarine mine. From the testimony of a passenger on board the "City of Washington" as related in the *Illustrated American* we take the following:

"We felt rather than heard, a frightful, sickening concussion; an instant afterward a column of flame lighted the entire harbor. During the next half minute explosion followed explosion almost too rapidly to be counted. Our vessel was a quivering mass. All around us was a vast cloud of smoke, steel, wood, mortar and mangled humanity. "After the heavier explosion had ceased and the

quoted, says further:

"The fact however, that a piece of the "Maine's" keel flew high in the air and landed upon our deck leads strongly to the belief that the force driving it must have been exerted from beneath the vessel, otherwise it must have been driven downwards. Of course it may be possible, though not probable, that it was one of those unaccountable freaks that accompany catastrophes of force."

Putting aside the theory of the explosion having taken place in the "Maine's" magazines (which accident would hardly have blown the keel upward), the only conclusion from the terrific nature of the force employed is that it was the work of a great submarine mine with electric connections.

This kind of destructive apparatus is not at all new; nor are the main features of a number of  
(Continued on page 36.)



# The Inventive Age

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WASHINGTON—NEW YORK, MARCH, 1898.

IN another column will be found an interesting article on the Rotary Shuttle Sewing Machine. The development of the sewing machine has been one of gradual growth, the basic feature of the present rotary shuttle being found in a patent back in 1855.

THOSE Indian inventors are not so far behind after all. A Ceylon paper speaks of wind-fans being worked by electricity—the power being obtained by guests in hotels by putting a penny-in-the-slot—guests being charged for just the amount of current used to propel the machines.

AT the monthly meeting of the Patent Law Association, held on March 15, in the Warder Building, various measures and patent matters were discussed, among which was the attorney's bill, which regulates the requirements for admission to the practice of patent law. This measure was recommended for passage by congress and it is thought that this will be done.

THE Otis Steel Works, of Cleveland, Ohio, are becoming celebrated for gun-manufacturing and the construction of gun-carriages. The successful casting of the Gattling gun has been accompanied by the construction of five of the largest gun-carriages ever manufactured in this country, for the use of the new 13-inch guns to be placed on the new battleships.

IT is stated that Supt. Coyle of the Indiana Natural Gas and Oil Company, has discovered a process of obtaining gas from wells that have been drowned out by water. As water is the only agency that will destroy gas wells, the value of the discovery will at once be understood. Mr. Coyle proposes to take abandoned wells and draw the gas out of them, the same as before the collapse.

THE *Electrical World*, foremost technical journal in the electrical field, enters upon its twenty-fifth year in a seemingly more prosperous condition than ever before. Speaking of the event the *World* says "it is customary on such occasions, to pause and look back." But the *Electrical World* doesn't pause. It glances over its creditable record and considers the wonderful development in the electrical field during the quarter century just passed; but it doesn't pause. It keeps right in the front rank.

SPEAKING of the bill before congress containing the novel feature "to reserve to the United States the right to condemn any patent at a fair cash value, when it is shown that the invention is of a character to be valuable to the people as a whole," *Invention of London*, says: "The right of govern-

ment to invade the settled laws of property, in times of grave public peril, has always been exercised, just as martial law supersedes civil procedure under like conditions. But in times of peace what would smack of tyranny and oppression in the latter instance would prove equally destructive to freedom of property rights in the former instance. The reserved right to condemn a patent once granted amounts practically to a confiscation of property, and gives dictatorial power of far-reaching scope to the official authorized to exercise it. The bill in question will never be seriously considered by congress. It is only a sporadic expression of socialistic bias."

## Annual Banquet of the Patent Law Association.

In the spacious, handsomely decorated banquet hall at Rauscher's, around a table of horse-shoe form, the Patent Law Association of Washington gave its annual banquet on the 19th of February, over sixty covers being spread.

In addition to its members present the Association had as its guests Associate Justices Morris and Shepard, of the Court of Appeals; Hon. J. D. Hicks Chairman of the Committee on Patents of the House of Representatives; Hon. C. H. Duell, Commissioner of Patents; Hon. A. P. Greeley, Assistant Commissioner of Patents; members of the Board of Examiners-in-Chief of the Patent Office and members of the Committee on Classification of the Patent Office, besides a number of individual guests of the members.

The president of the association; Gen. Ellis Spear, presided in a most gracious and happy manner, and in his opening address took occasion to dwell on the growth and demonstrated usefulness of the association. Informal addresses were made in response to calls from the chair, by Mr. Justice Shepard, Representative Hicks, Mr. Commissioner Duell, Mr. Assistant Commissioner Greeley, Judges Brickenstein and Steward, Mr. Rice, Mr. McIntire, Mr. Mauro, and others. Notes of regret from Senator Platt, Chairman of the Committee on Patents of the U. S. Senate, and Chief Justice Alvey of the Court of Appeals were read by the chair.

In his remarks Mr. Justice Shepard took occasion to express his appreciation of the aims of the association and commanded the same in high terms Representative Hicks, in a very happy manner, stated his full appreciation as to the past, present and future usefulness of the association, assuring the members that their co-operation with his committee would be always acceptable and appreciated. He was wholly in favor of proper and adequate patent office legislation, modestly stating, however, that he alone did not constitute congress, and that he thought the profession should lend a helping hand. Mr. Commissioner Duell spoke feelingly of the profession and the association. Coming as he does fresh from the field of active practice, and occupying the important position of commissioner of patents, his remarks were listened to with the utmost attention, and his statements and suggestions were apparently fully appreciated. Mr. Commissioner Greeley, in an impressive manner, dwelt on the efforts of the office in relation to reforms in connection with the practice before the office and the needed legislation in relation to adequate appropriations for the office.

It was apparently the universal opinion of the guests and members of the association, as evidenced by the remarks of the speakers and general conversation, that the need of a competent and well equipped classification division in the patent office was of vital importance, not only to the office but also the public.

What proved to be the most enjoyable and successful banquet held thus far by the association closed with very happy remarks by Mr. Phillip Mauro of the Washington Bar. The committee in charge of the banquet, Messrs. W. C. McIntire, J. L. Norris and L. S. Bacon, were warmly congratulated for their efforts in connection with the affair.

The Patent Law Association has made it a practice to have an annual banquet, and in addition

thereto at frequent periods it holds informal dinners, at which meetings general matters of interest are discussed. It is noteworthy to state that while the Association is but a little over a year old it has now on its list over eighty members, and while one of its particular aims has been, and is, to insist upon strict professional conduct on the part of its members, it also aims to assist the commissioner of patents in all matters in which it can be of assistance; to call attention to irregularities; to hold discussions concerning, and to take action about such other matters as may arise and be of interest to the profession.

## Invention of Lamps.

The invention of lamps is ascribed to the Egyptians. In the British Museum are two colored glazed tiles which were fixed in the center of the ceiling; each has a large knob pierced through the base to receive a cord for suspending a lamp; around the base of each is an inscription stating that it formed part of the decoration of the Temple of Kammuri at Calah Nimrod in the time of Assurubla, 883 B. C. What the lamps were made of cannot now be ascertained, but there is plenty of contemporaneous glass which has been discovered in the neighborhood.

The sacred lamps in Greek temples, whose undying flames were perpetually watched by vestas, were probably of metal, and the wick formed of asbestos.

In the public bath at Pompeii too lamps were used, each to light two rooms. These lamps were protected by circular convex glasses, fragments of which were found on the spot.

The marvellous accounts by mediaeval authors of perpetually burning lamps found in ancient tombs seem too numerous and too well attested to be altogether fabulous. When the tomb of Pallas, son of Evander, who is mentioned by Virgil, was discovered about the 12th century by a countryman digging near Rome, it is said a lighted lamp was still burning over his head, which must have been lighted more than 2,000 years, and might be called eternal.

Baptista Porta, in his treatise on Natural Magic, relates that about 1550 a marble sepulchre of the Roman period was discovered in an island near Naples, and on opening the tomb was found a phial containing a burning lamp. This light became extinct on breaking the phial and exposing the flame to the open air. It was supposed that this lamp had been concealed before the Christian era, and those who saw it reported that the lamp emitted a splendid flame.

In 1550 a remarkable lamp was found near Atestes, Padue, by a rustic digging, who unearthed a terracotta urn containing another urn, in which was a lamp placed between two cylindrical vessels, one of gold and the other silver, each of which was full of a very pure liquid, by whose virtue the lamp had been kept shining upward of 1,500 years. This curious lamp was not meant to scare away evil spirits from a tomb, but was an attempt to perpetuate the profound knowledge of Maximus Olybius, who effected this wonder by his extraordinary skill in chemical art.

St. Augustine says a lamp was found in the Temple of Venus, exposed always to the open weather, and which could never be extinguished. Ludovicus Fives mentions another lamp, which was found a little before his time, that had continued burning for 1,050 years.

Licetus is of the opinion that the perpetuity of these lamps was owing to the consummate tenacity of the unctuous matter with which the flame was united being so proportioned to the strength of the fire that, like the radical heat and natural moisture in animals, neither of them could conquer or destroy the other. In order to preserve this equality of proportion these lamps were hid in caverns or closed monuments. On opening these tombs, the admission of fresh air has produced so great an inequality between the flame and the oil that they have become extinguished. In Henry VIII's time a lamp was found in a monastic tomb that had been burning for 1,200 years.—*The World of Progress*.

## Running Gear.

William D. Widders, of Fairland, I. T., has invented and patented a running-gear for railway cars, in which the ball-bearing idea is employed. In this the balls come in direct contact with the rails, and the wheel is kept from jumping the track by the use of grooved rollers arranged at the bottom of the wheel, to engage with the upper edge of the rail. Greater increase in speed is claimed for this wheel, and the side rollers may make travel safer.

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# THE GROWTH OF THE STEAM ENGINE.

By L. N. GILLIS.

## II. WATT AND HIS SINGLE ACTING ENGINE.

Heretofore all engines had been, as noted in the previous article operated really by the pressure of the air, the steam serving merely to produce the necessary vacuum. The next step in the progress of the art was the invention of an engine operated by steam at a comparative high pressure, and not dependent upon the air.

Prior inventors had proposed to use the elastic force of steam, but the machine had never been reduced to practice. In 1720 however, Leupport did invent an engine in which pressure was used to produce the desired effect. Figure 7 shows this engine in practically the same form as drawn by Leupport himself.

By means of the four way valve, shown just above the boiler, steam was admitted alternately to the pair of cylinders supported upon the boiler setting; and, by the same valve, the steam was exhausted from the cylinder through the exhaust nozzle into the air. This engine was used, as were the former engines, chiefly for pumping, and came rapidly into favor in spite of the danger then attendant upon an engine of this description.

Accidents due to explosions of the boiler and bursting of the cylinder, were only too common in the first specimens of this device, and the expenses attendant prevented substitution for the earlier engines in spite of the other benefits to be derived therefrom; and all this combined prevented the use of the device in the place of the early Newcomen engines.

This engine, then called a high pressure engine, would now go in exactly the opposite class and be ranked among the low pressure engines; but we must recollect that even as late as 1826 a pressure of fifty pounds to the square inch was held to be beyond all possible limits of safety.

Smeaton, the celebrated engineer, about this time, began a series of experiments looking towards improvements upon the engine of Savary and Newcomen. While he did succeed in making some improvements, notably arranging the engine of New-

comen along the line of the atmospheric engine. In the winter of this year, Watt, at that time an instrument maker, was employed to repair a model of the Newcomen engine owned by the University of Glasgow. The defects in this engine occasioned him to endeavor to discover the cause and he soon found that many errors had been made in the expansive force of steam as previously calculated. Thereupon he constructed an experimental boiler to show the exact amount of water evaporated and the amount of steam used at each stroke of the

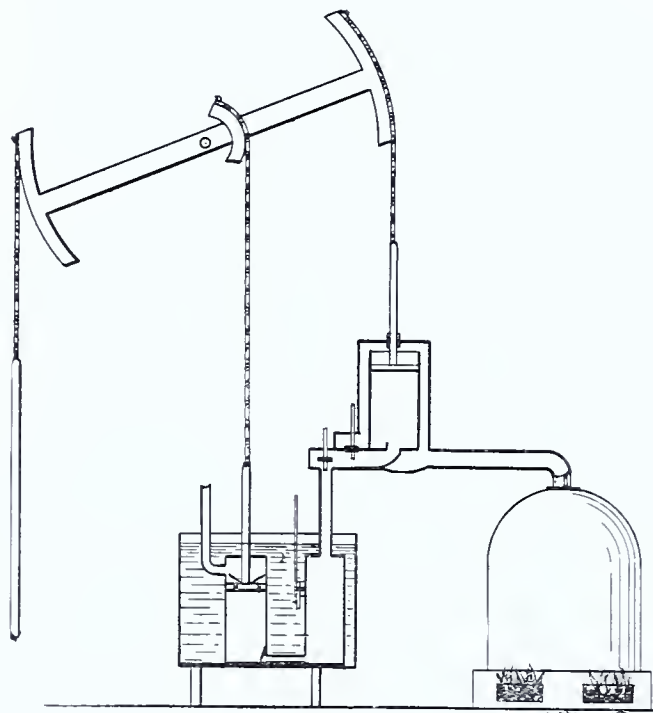


FIG. 8.

piston. The latter he found to be sufficient to fill the cylinder a number of times. In the course of these experiments his attention was attracted to the fact that a given quantity of steam would raise to the boiling point about six times its weight of water at ordinary temperature. Being acquainted with the celebrated Dr. Black he mentioned this fact to him. The professor thereupon explained to him the newly formulated theory of latent heat of which he was the author. Further experiments demonstrated the fact that with the increase in temperature the pressure of the steam also increased; and while the temperature increased in an arithmetical ratio, the pressure followed geometrical ratio. This clearly indicated the desirability of using steam at a high temperature. The well-known fact that water would boil in a vacuum at less than its normal boiling point indicated that in a condensing engine of the Newcomen type, the temperature of the cylinder must be kept very low to condense the steam. This clearly showed that an engine constructed to condense the steam within the cylinder must of necessity be very wasteful of power.

Having these foundations to build upon, Watt commenced a series of experiments with a view of constructing an engine in which the cylinder should be kept as hot as the live steam, and in which the latter should be condensed at a temperature much less than the normal boiling point.

In 1765 Watt introduced a separate condenser for the steam. He said in speaking of the matter, that it had come to his mind, "that if a communication were opened between a cylinder containing steam, and another vessel which was exhausted of air and other fluids, the steam as an elastic fluid would immediately rush into the empty vessel, and continue so to do until it had established an equilibrium; and if that vessel was kept very cool by an injection, or otherwise, more steam would continue to enter until the whole was condensed." This opened a way to the solution of the whole difficulty, and the problem was practically solved.

The details rapidly shaped themselves into form in the mind of the inventor, and all that remained to do was to reduce the device to practice. Watt's method of keeping the steam cylinder, hot was to inclose the same in an atmosphere of steam, thus originating the well known steam jacket of today. His condenser he surrounded with cold water and attached thereto an air pump, automatically operated by the engine, to keep the condensing cylinder practically empty.

Figure 8 shows a diagram of an engine of the single acting type, as invented by Watt.

While Watt had completed the idea of his single acting engine, much disappointment was in store

for him before he could use the same, or put it upon the market. In the first place, the progress of the other mechanical arts had not kept pace with the invention of the steam engine. The result of this was that it was found to be very difficult to procure a cylinder with an even bore. Further, Watt's mind for a time, was taken up with the idea of a rotary engine. To add to these, Watt, it must be remembered, was a comparatively poor man and his experiments had drawn upon him a debt of about £1,000. This caused Watt to seek the assistance of others and in his first experience he was unlucky in the selection of a man of small means and who finally became insolvent himself. By his assistance however, Watt was enabled to build one engine and to take out on January 5, 1769, his first patent for "a new method of lessening the consumption of steam and fuel in fire engines."

The failure of Dr. Roebuck, his first partner, caused Watt to enter into an arrangement with a Mr. Boulton, of Soho. This was the turning point in Watt's fortunes, and John Wilkinson, having introduced a new boring machine, was called upon to furnish a cylinder which proved a great success. In 1775 Watt, in view of the important nature of his invention, obtained a special act of parliament securing to himself the monopoly of his invention until 1780.

From this time on, the success of the invention was certain. Watt soon received numerous orders from various sections of the country for the erection of his engine. These engines were built on a royalty depending on the saving in fuel, which was ascertained by counting the number of strokes of the piston. To do this Watt invented his engine counter.

This perfected the single acting engine as conceived by Watt and brings us to the time when he began the use of steam on both sides of the piston head.

### Need of Greater Force in the Patent Office.

Mr. Edwin Prindle contributes an excellent article to the March *Forum* on our patent system in which appears the following argument for improved service:

"The complaint is made that our patents are so frequently upset in court that it is difficult to enlist the aid of capital in support of really meritorious inventions. In view of the comparatively small force in the patent office, it is strange that so large a proportion of patents is sustained as is the case. Among the governments having patent systems in extensive use ours alone (with one exception, perhaps,) seeks to grant only such patents as will be sustained by the courts. There are about a million patents of all countries, besides numerous scientific publications, which must be considered in determining whether or not an invention is new. It is not impossible to perform this task with reasonable certainty; but, to do it, there must be a proper classification of the records, and ample time to consider them. At present the arrangement of the patents is such that usually there must be considerable doubt as to whether or not the field of search has been fully covered. Numerous questions of form and merit arise in connection with each application for a patent; and the conflicting claims of rival inventors necessitate long and complicated proceedings to determine who is entitled to the patent.

What judge would undertake to make in one year over seven thousand preliminary and final decisions, many of which involve large sums of money, as does the primary examiner in one of the divisions of the patent office—and that division not the busiest one?

With a sufficiently large corps of examiners the invalid patents could be reduced to an insignificant number, so that capital might be more readily found for this form of investment. This inability of the patent office to cope with the enormous amount of work imposed upon it is, I think, the greatest difficulty in the way of the successful operation of the patent system. In view of the fact that the earnings of the patent office have exceeded its expenses by over \$5,000,000, there should be no difficulty in securing the legislation necessary to increase the force of examiners.

The gold of Alaska, on which the attention of mankind is just now fixed with brilliant anticipation, may not, in the end, turn out to be the greatest treasure which that land possesses. The Alaskan forests appear to be among the most valuable in existence. Extending from Cross Sound, a little south of Mount Fairweather, to the Strait of Juan de Fuca, partly in Alaska and partly in British Columbia, lies what Garden and Forest describes as the greatest continuous body of timber of the cone-bearing or pine family in the world, "almost unmarked as yet by the ax, safe from fire, and of easy access." Security from fire, due to the moist climate, is regarded as one of the chief causes of the continued existence of these magnificent forests.

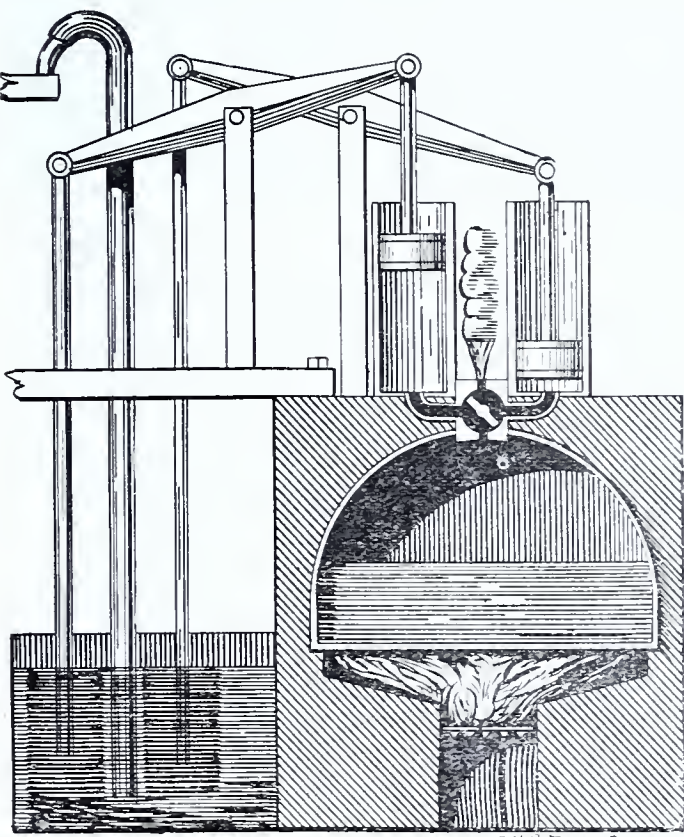


FIG. 7.

comen in a portable form, it remained for Watt to analyze and discover the true principles upon which the steam engine operated as well as the principles of the mechanisms used therewith.

To Watt we owe the invention of an engine operated by steam applied to both sides of the piston as well as the simple acting engine. Watt was not an engineer, had not had an education along this line, but by reason of the great powers of analysis with which he was gifted and his fondness for experimental work, he became the most prominent of all the inventors who had to do with the advance in the use of steam power which has led to the beautiful mechanisms of our present day.

Previous to 1763 Watt had tried certain experi-



## ILL-FATED MAINE AND THE INFERNAL MACHINE.

(Continued from first page.)

torpedoes now in use. The torpedo came upon the inventive stage only three years less than a century ago. Its destroying power was demonstrated, but incredulous nations to which it was offered failed to appreciate the advantage of such a weapon of war.

barrel torpedoes in less than one month—between March 28 and April 18, 1865.

Among other torpedoes used in the late war were, the "frame torpedo," a wooden frame, supporting in the water a post held at an angle of 45 degrees, and having at its top a waded shell, to be fired on contact, by a percussion-cap and spring arrangement; the pronged torpedo—usually a double-pointed tin can—having forked rods extending up-

long and seven foot beam; they were run with a steam engine, were sharp at both ends, and carried at the bow a torpedo spar, divided at the base and hinged at both sides of the vessel just aft of the cut-water, so that the torpedo-carrying end could be raised by a line when not in use.

The "New Ironsides," while lying off Fort Wagner, during the bombardment in April, 1863, had a narrow escape from destruction by a submarine mine. She lay for an hour directly over one of these which contained 2,000 pounds of powder, and would have been blown to pieces if the electric wire attachment to the mine had not failed to work.

Over forty vessels of various kinds were either destroyed or injured by torpedoes during the civil war. One of these was the U. S. ironclad gunboat "Cairo," which was completely wrecked by this means. Another was the confederate ram "Albermarle," destroyed by Capt. Cushing, while she lay at the dock. At this time the ram was surrounded with a log raft obstruction extending thirty feet from her off-shore side; but notwithstanding this, the Cushing, with a small boat bearing a spar torpedo, on the night of October 28, 1864, pushed the weapon of destruction across the raft and exploded it under the doomed ship. His boat was injured, and he and his men found it necessary to jump overboard to save themselves.

## The Omaha Fair.

The accompanying illustration presents a fine view of the buildings, grounds, etc., of the Trans-Mississippi and International Exposition, which will be opened at Omaha, Nebraska, on June 1, 1898.

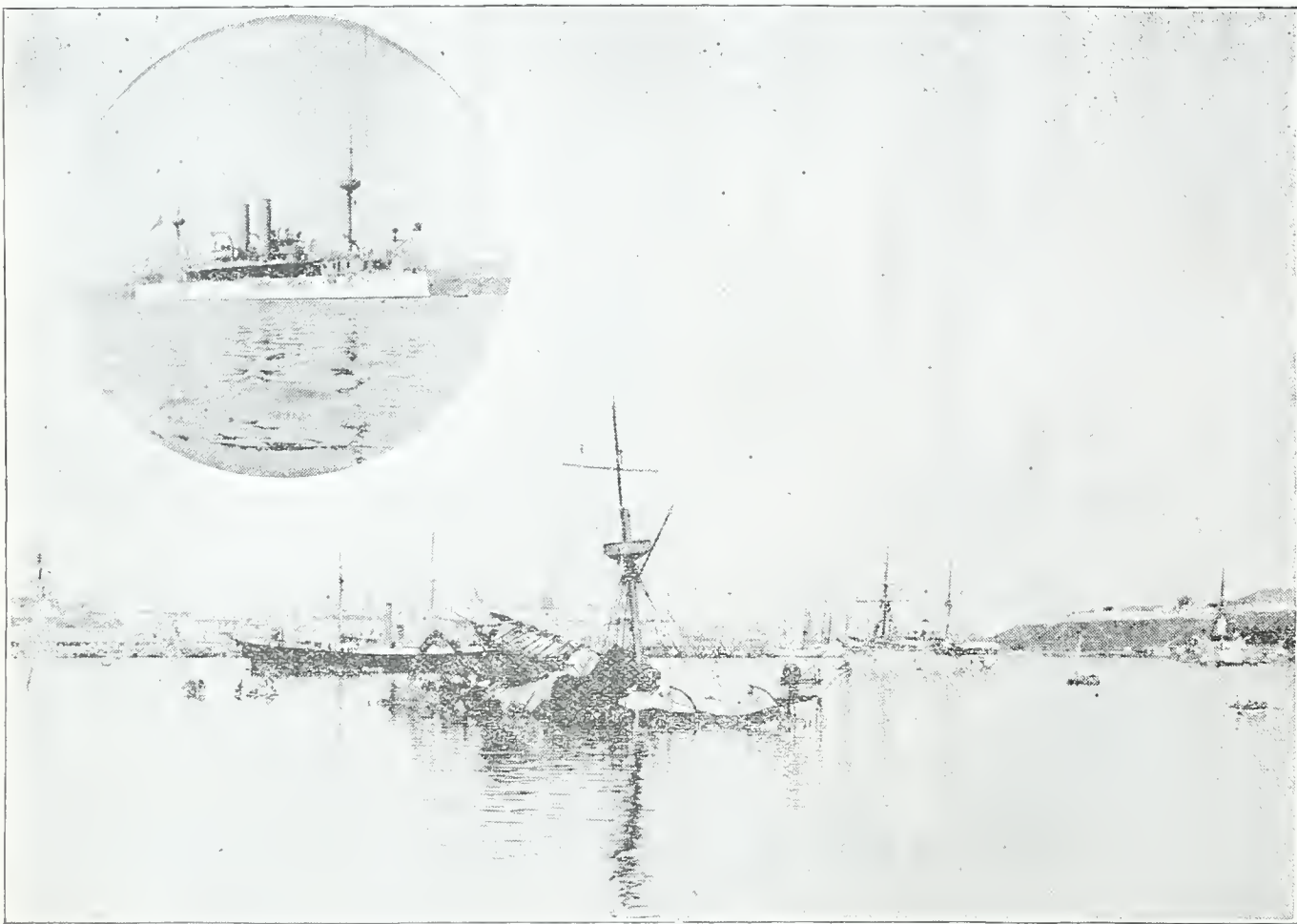
From the prospectus issued by the managers of the Exposition, it is apparent that the latter will be an epoch maker in the industrial history of Nebraska. It will gather into its vast and beautiful buildings the rarest products of many states, and some from foreign countries, which will be set before the hundreds of thousands of visitors, in interesting and instructive object lessons. All the departments of art and science will be represented in the exhibits, and the surroundings will be arranged in the most attractive manner.

Among the charming features to be displayed are vine-shaded promenades of columns, treated in Pompeiian manner, which are to extend between the buildings, situated around an artificial water basin, thus affording nearly a mile of continuous shade. The "mirror" with its artistic accessories is to be the center of a beautiful park, where winding walks, amidst arbors and gardens where floral designs, lead to the water. Here music pavilions, restaurants and other attractions, including various kinds of pleasure boats—not excepting the well-known gondola—will make this spot a favorite resort, while swimming, diving and other diversions are to add their quota to the general pleasure.

There will also be shown many striking and charming effects in electricity, not the least of which will be the electric water grottoes—the Blue Grotto of Capri and the Mammoth Cave, which can be visited only by boat. Fine effects in light and color are to be shown here, reflected from glittering rock crystal and tinted by many colored electric globes placed under water. The plan of the grounds, the grouping and design of buildings, and the scheme of color, are all to be totally different from any former achievement; and all this with classic sculpture, intricate carving and the many other features of the exposition will make it one long to be remembered.

A part of the exhibit, of much value and interest to inventors and manufacturer's will be a fine display of models and machines loaned for this purpose by the United States Patent Office, for which the sum of \$20,000 will be available for the work. As the Patent Office has not, since 1870, required models from inventors, except in very rare cases, this display, as a mechanical feature, will not be complete—unless it is brought up to date by private contributions of models, etc. For carrying out the completed idea in this respect, a special section for models and inventions has been created; and inventors are invited to communicate with G. W. Sues of Omaha, Nebraska, in regard to placing their inventions on exhibition. In this department one of the latest of Thomas A. Edison's inventions—now under construction—will be exhibited.

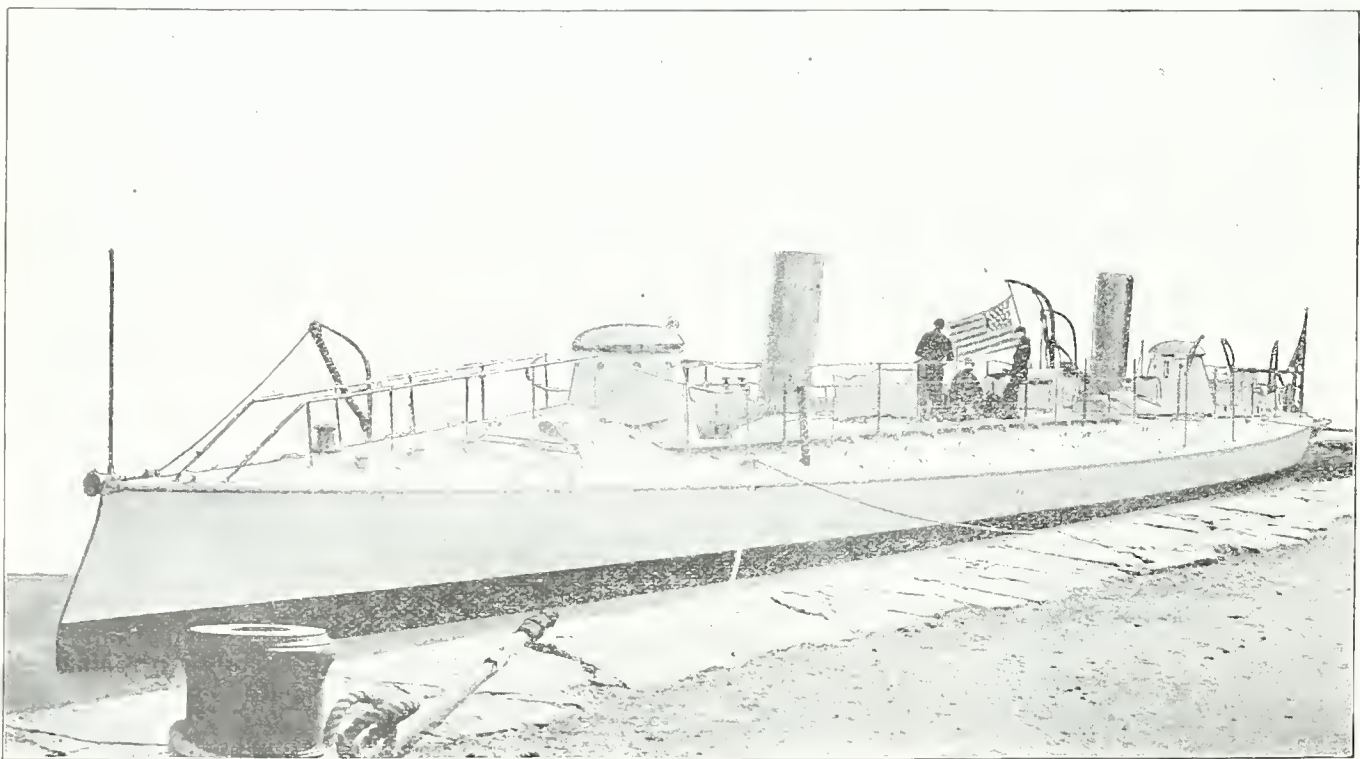
The proposed consolidation of the wire and wire-rod interests of the country has fallen through.



VIEW OF HAVANA HARBOR AND THE WRECK OF THE "MAINE." [Courtesy Washington Star.]

In 1854 the Russians used the torpedo in the Baltic, but it was not until the Armenian civil war that this means of aggression and defense was largely employed. During this period—from 1861 to 1865—a great variety of torpedoes were used, principally by the confederates in the protection of their rivers and harbors. The kind easiest made, and one which was most largely re-

ward, so that a vessel coming in contact with them would explode the friction tube; the electric torpedo, or submarine mine, fired by wire running from the shore to the powder case, in which was an incandescent platinum wire; drift torpedoes, usually percussion, exploded by trigger upon contact; and the spar torpedo, a copper case filled with powder and placed at the end of a spar or boom, which was at-



THE "CUSHING," HIGH TYPE OF MODERN TORPEDO BOAT, SPEED 27 MILES AN HOUR.

lied on, consisted of beer-barrels charged with from 35 to 120 pounds of powder. These barrels, before receiving their exploding charges, were first caulked and pitched, after which they were capped with friction fuses to be ignited by contact, and moored in entrance channels. In one neighborhood alone, near Mobile, Ala., six vessels were blown up by

tached to the bow of a boat and exploded by percussion when rammed against a ship.

The Federal ship, "New Ironsides," was, during the late war, struck by a torpedo of the latter kind and badly injured. The attack was made by a David torpedo boat. These boats were made of wood and iron and were from forty to sixty feet



### Museum Object-History at Omaha.

In this time of rumors of war and great disturbance of the public mind, it is cheerful to know that the wheel of our country's glorious progress rolls on without "skipping a cog" or slacking in the least towards its magnificent destiny. The busiest people on earth (those of the United States) are going right ahead in all the departments of labor, gathering their products, now and then, in some progressive city to show to the world in object lesson, the perfection of art, science and industry and the natural resources of the Great Republic.

There will be shown to much advantage at the coming Trans-Mississippi and International Exposition, to be held at Omaha, from June 1 to October 31. And not the least of the exhibits there, will be those made by the U. S. Government, to which the Smithsonian Institution, through its various branches, the Bureau of American Ethnology, the Bureau of International Exchanges, the Zoological Park, the Astro-Physical Observatory and the National Museum, will contribute most interesting

In doing this an oblong section of card-board is used, which conforms to the plan of the exhibiting space allowed, and on which small pieces of card-board are fastened to mark the positions of the different exhibits. The latter will comprise about forty different features, and will be arranged to show the development of the human mind and the progress of invention along the various lines.

The household will be represented by the object history of domestic arts; the art of personal adornment, in costume and other things will be shown, as will be the textile art, and a long series, displaying culture development, will add beauty and instruction. In the latter particular ceramics will play an interesting part. And it should, for the potters art began in pre-historic time, and brass second, in many forms and kinds, of ancient people, telling in shape and in decoration the story of the household, of customs, cults, myths and folklore. Musical instruments will tell the story of sound for human entertainment. These began their history many hundreds of years ago, as is shown in old music-makers seen in the Museum, not the least interesting of which is the rebeck, a boned instrument, which originated with the Moors and preceded the Ravenastron, also played with the bow, and one that forms a close connection with the violin now in use. Agriculture is to be represented

idea of the object-history display than that which has already been told—is something which concerns all humanity. It may be taken as a matter of course that the first fire fell from the clouds, in shape of lightning. The latter struck something, set it on fire, and, behold! man, when he came upon the terrestrial stage, had simply to put going the means provided by Heaven for his welfare.

The lightning feature will not be displayed at Omaha. It would be altogether too dramatic, if the clouds could be persuaded to such a performance but, Prof. Hough, who conducts the "fire department" of the Museum, will have in his exhibit some very old fire-making apparatus. The evolution of fire-making methods began with wooden implements, the first forms of these being simply pieces of wood containing holes for the reception of the end of a stick, which was twirled by the hands until friction caused the ignition of grass or other tinder used in connection with the apparatus.

Another method (used by various Indian tribes, and of ancient date) employed in making fire by friction, was one in which a bow-drill was used in place of the hand-revolver stick. In this the upright drill extended through a hole in a horizontal piece of wood and engaged with its (the upright) top the middle of a cord, which was fastened at each end of the horizontal piece. By putting two fingers (one on each side of the upright) on the cross-piece and working it up and down, the drill, or friction-maker, was made to whirl rapidly, put in one direction, then in the other. When the fire point was reached, tinder was employed to make a blaze, as in the first case.

Some of the Malays make fire by sawing. This is accomplished by cutting a notch in a bamboo and sawing in this with another piece of this wood, having a wedge-shaped edge, until the heated particles fall below and ignite. This method, with a little change, is also used in Burma and other places. Obtaining fire by "plowing" is a method once used extremely by the polynesians and some other aborigines. For this a sharp piece of hard stick was rubbed against the inside of a section of split bamboo; ignition began in the dust of the latter and was taken up by dried grass.

The wood friction process in producing fire is extremely old; and immediately after it comes the "idea in flint," the latter having been used in connection with pyrites by the ancients to "strike a light." The combination was also used by many savage tribes, and, as time went on, the tinder-box used for catching the sparks was added. Following this came flint-and-steel, used for making fire, as gun lock attachments, torpedoes, etc.

After many years of hard knocks, the flint-and-steel apparatus took its place among the things "that were" and the match began to light its way along the path of years, to perfection (?)—which can often be dispensed with by pressing an electric button.

All this, and more, will be set forth at the Omaha Exposition. And those who go there will find in Uncle Sam's exhibit from his National Museum, a splendid history-chain—an entertaining object-lesson—that reaches almost from Adam, and his happy estate, to near the dawn of the 20th century, and glorious American progress.

A scheme has been laid before the lumbermen in Ottawa by which the sawdust, which has been a serious nuisance in the Ottawa river for many years, is to be utilized for the manufacture of calcium carbide under the process patented by Prof. Wilson of St. Catharines, Ont. By this process the sawdust, slabs, bark and all refuse from sawmills can be rapidly converted into carbon. This carbon is powdered and subjected for ten hours to an intense electrical current, strong enough to convert iron into a boiling mass and lead into an explosive gas. The result is calcium carbide. The mass is then broken into small lumps and in that form shipped in tin cans to consumers. It is used for the manufacture of acetylene gas.

We have received from Mr. Henry H. Remfry, of Calcutta, a very interesting little booklet for inventors in which the author points out the kind of inventions most likely to pay the inventor or promoter who goes into the field of India and the East. As the author says, "It seems an opportune time to refer to one of India's most pressing needs—the general introduction of useful and cheap contrivances with a view to meet the manifold wants and needs of her teeming millions and enable inventors to turn her natural resources—vegetable and mineral—to better and more profitable account than hitherto."

Paper gas pipes, light, cheap and unbreakable, are made in England by wrapping paper around a rod in the desired diameter and dipping each layer of asphalt as the rod revolves. The joints are also made of paper covered with asphalt.



BIRDSEYE VIEW OF OMAHA EXPOSITION GROUNDS.

matter. The government's representatives for the exhibition are W. H. Michael, Department of State; C. E. Kemper, Treasury Department; Capt. H. C. Ward, U. S. A., War Department; Commodore Logan, Navy Department; J. B. Brownlow, Post Office Department; F. W. Clark, Department of the Interior; Frank Strong, Department of Justice; J. H. Brigham, Department of Agriculture; F. W. True, Smithsonian Institution and National Museum, and W. DeC. Ravenel, U. S. Fish Commission. Mr. W. V. Cox, of the Museum, will be secretary to the government board of management.

The whole amount appropriated by congress for the government exhibit is \$200,000. This sum is apportioned as follows: State Department, \$4,125; Treasury, \$15,583.33; War, \$10,000; Navy, \$12,000; Post Office, about \$7,000; Interior, \$16,500; Agricultural, \$13,750; Justice, \$2,750; Smithsonian, about \$19,000; Fish Commission \$18,000; common fund, \$18,000.

The general plan of the government exhibit will be much after that it used at the Tennessee Centennial Exposition. At this one of the main features was the exhibit made by the National Museum, which at Omaha, will make a display, which alone, would be sufficient inducement for a trip to the fair. The work of getting ready for this is making good progress under the direction of Mr. F. W. True, Executive Curator of the Museum, Prof. Geo. P. Merrill, Prof. W. H. Holmes, Prof. O. T. Mason, and their co-laborers, and in due time everything will be in order for shipment.

About 5,000 square feet of floor space will be occupied at the exposition by this display, the arrangement of which is being carefully made, so that every department will have its allotted position.

in a series of object lessons beginning with the rude implements with which the savage worked, to the most improved apparatus that now make toil less laborious and rapidly add to the wealth of the world. Transportation will be illustrated with the ancient method of human carriers, pack-animals, cart, and then on down to the steam and electrical age.

The exhibit showing different methods employed in illuminating dwellings will take the observer from very early beginnings in light-making, to the present, with its electric apparatus that turn night into day. In this will be seen the fat duck of the Swiss Lake Dwellers, who for illuminating purpose simply put a wick into the bird and lighted the end extending from its bill. Another strange manner of making light, to be shown, was employed by the Alaskan Indians. For this a fish (the candle-fish) was employed, on account of its extremely oily nature; a wick composed of bark was put into its mouth, and the "candle" was ready for lighting. The lamp used by the Esquimaux was almost as simple as the duck and fish kind. It consists of an open stone receptacle for holding oil, and has around the edges a fringe of moss arranged so that its lower portion is brought in contact with the oil: the upper part is lighted, making a square or a circle of fire, according to the shape of the vessel.

The electric exhibit will be a most interesting feature of the museum's display at the fair. It is having able attention by the officials interested in this branch of work (among whom is Mr. Geo. C. Maynard), who will be aided by Prof. Alexander Graham Bell.

Among the object-stories that will be so well told by the National Museum, at the Omaha Exposition, will be that which relates to fire-making. This—of which a description may serve to give a better



### The Commissioner's Report.

The Report of the Commissioner of Patents, made for the year ending December 31, 1897, which this issue of the INVENTIVE AGE timely lays before its readers, is one of much interest. In this Mr. Greeley, Acting Commissioner after the death of Mr. Butterworth, prefaces the detail of patent office business with a tribute to the character and work of the late commissioner, and gives a complete and clear idea of the work of the patent office. In observing this we find as usual that the office is in a flourishing condition, with its income exceeding expenses by \$252,798.59; the total receipts being \$1,375,641.72. The number of patents to citizens of the United States was 21,508, as against 2,221 to all foreign countries.

In a summary of the tabular work of the report is the following statement:

#### SUMMARY OF TABLES.

In 1897 there were received 45,661 applications for patents, 2,150 applications for designs, 94 applications for reissues, 2,176 caveats, 1,946 applications for registration of trade-marks, 66 applications for registration of labels, and 26 application for prints. There were 23,729 patents granted, including designs, 65 patents reissued, 1,671 trade-marks registered, and 14 labels and 16 prints. The number of patents that expired was 12,926. The number that were forfeited for non-payment of the final fee was 4,891. The total expenditures were \$1,122,843.13; the receipts over expenditures \$252,798.59. The total balance to the credit of the patent office in the Treasury of the United States on January 1, 1898, was \$4,971,438.06.

In proportion to population more patents were issued to citizens of Connecticut than to those of any other State—1 to every 786 inhabitants. Next in order are the following: Massachusetts, 1 to every 1,880; District of Columbia, 1 to every 1,316; New Jersey, 1 to every 1,377; Rhode Island, 1 to every 1,421; New York, 1 to every 1,585. The fewest patents were granted in proportion to the number of inhabitants in the following states: South Carolina, 1 to every 38,371; Mississippi, 1 to every 16,120; Alabama, 1 to every 15,598, and Georgia, 1 to every 14,133.

As to the foreign countries, 706 patents were granted to residents of England; 551 to those of Germany; Canada, 286; France, 222; Austria-Hungary, 58; Scotland, 48; Belgium, 45; Switzerland, 44; Sweden, 32; New Zealand, 30; Victoria, 30; Russia, 21; New South Wales, 19; Ireland, 17; Netherlands, 13; to Denmark and Italy, 10 each; to India, Mexico, and South African Republic, 9 each; to Norway and South Australia, 5 each; to Hawaii, Jamaica, Newfoundland, and Queensland, 4 each; Roumania, 3; to Argentina, China, Cuba, Natal, Spain, and Venezuela, 2 each, and to Cape Colony, Chile, Egypt, Finland, Guatemala, Island of Aruba, Java, Siam, Tasmania, West Australia, and Windward Islands, 1 each.

The report furnishes an excellent comparative statement showing the number of patents issued by this country and foreign governments, from the earliest periods of this work to Dec. 31, 1897. In this the total foreign product (from fifty-three countries) amounts to 1,122,724 patents, while the United States alone has 606,423—more than one-half of all the balance of the world's inventive product.

Of the foreign patents France leads with 286,081; Great Britain has 252,990 to her credit, and Belgium with 139,742, and Germany with 113,254, come next in order of patent importance. The smallest issues were in Siberia and the Bahamas, each having 2, and in St. Helena, 4.

It is stated that the number of applications for patents received during the year 1897 was the largest in the history of the office, and that there is a steady increase in this branch of the work. In dealing with office work, the commissioner says:

"There is no provision of law by which the force or facilities of the office for doing its work can be increased to meet increased work. All money received is by law required to be paid at once into the treasury, and not one penny of the receipts may be paid out except by act of congress. However large the receipts of work, however large the amount of fees paid for the performance of that work, however important it may be for the interests of the inventors and the public that the work paid for should be performed without delay, the commissioner cannot secure the assistance of one additional examiner, one additional clerk, or even one additional messenger boy at thirty dollars a month without an act of congress. Inventors and the public would in many cases gladly pay fees even larger than the present ample adequate fees if they could receive prompt action; but such overpayment would not render the commissioner any less powerless to give the prompt action needed.

The work of the office is, as might be expected, largely in arrears. The number of applications

awaiting action December 28, 1897, was 11,382. Of these 7,858 were applications which had not been taken up for examination. Many of them had been waiting for examination three or four months, some of them more than six months, to the serious injury of the applicants and to the detriment of the public. The coming months of March, April, and May, which always bring very heavy receipts, are certain to add very largely to the arrears of work, and unless relief is given by congress by providing additional force in some sense corresponding to the increase in receipts of work, the work must fall even farther in arrears, almost hopelessly in arrears.

This increase in arrears is not due to lack of earnest effort on the part of the employees of the office. Each of those charged with the duty of examining applications is disposing of more cases, doing more effective work, even under circumstances which render the work of examination more difficult, than each person so employed was doing ten years ago. In 1886 the 188 persons in the examining corps acted on 37,500 applications, or 252 applications more than the number received that year, lessening the arrears of work to that extent. In 1887 the same number acted on 36,317 applications. The average number of applications acted on per man for each of these two years was 196.

In 1896, 200 persons in the examining corps, notwithstanding the largely-increased field of search, acted on 47,329 applications. In 1897 the same number acted on 44,546, a total for the two years of 91,875 acted on out of 95,838 filed. The average number acted on per man for the years 1896 and 1897 was no less than 229 each year, an increase in number acted on of 17 per cent.

Notwithstanding the increase in efficiency, it is evident that, the increase in receipts of work being so great, the present force is wholly inadequate to dispose of the present work."

The patent system of the United States is thus, in part, dealt with:

"The patent system of the United States differs from the English system, which is the system adopted and in force in many of the European countries, in that an examination into the novelty and patentability of every application for patent is made as a preliminary to the grant of a patent. Carried out to its full intent this system would result in the grant of valid patents only and would prevent the issuance of a patent for any invention not new and useful. The law contemplates that only patents for new inventions shall be issued and every patent is *prima facie* evidence of the novelty of the invention claimed therein.

"Under the English system applications for patent are granted without preliminary examination as to the novelty of the invention claimed, with the result that many invalid patents are granted.\*

"While it is not possible to determine with absolute certainty the novelty of every invention for which application for patent is made, since use of an invention in some obscure section of the country, if prior to the making of the invention by the applicant, is sufficient to negative its novelty and defeat the patent granted, it is possible to determine with certainty whether the invention has ever been patented or described in a patent or printed publication prior to the time when it was made by the applicant. This is the work of the patent office, and it is done with a completeness and accuracy which is remarkable under the circumstances of inadequate force and inadequate facilities."

In speaking of the effect of the inadequacy of the patent office force upon the validity of a patent—that insufficient help must cause a lack in thoroughness of search, Mr. Greeley says, that "the examination of an application should be, and can be, with a reasonable increase of force and facilities, made so thorough and complete that no patent shall be issued without full consideration of every patent and publication which may negative the novelty of the invention, so that the only question left to the courts shall be that whether or not what is claimed as new in the patent involves invention, and whether or not the patent is invalidated by prior use."

The portion of the report referring to patent lawyers—a subject which has been not long since treated in the INVENTIVE AGE—is one of importance, in which attention is called to the value of the employment by inventors of competent and honest attorneys, and the results of dishonest and incapable practitioners. Disbarments and the new rule—adopted August 17, 1897—relating to registration of attorneys, are also treated of.

#### INFLUENCE OF INVENTION.

The influence of invention on new industries is well set forth in the report, as seen in the following:

"The influence of patented inventions is most strikingly shown in the creation of new industries of enormous magnitude since 1880—that is, within the term of patents now in force or but very recently expired.

"Of these new industries the most noted are those directly connected with the development of electrical inventions, such as the manufacture of electrical apparatus and supplies, the supplying of electricity for lighting and power purposes, electric railways, and the telephone.

"The manufacture of electrical apparatus and supplies began to be of importance shortly before 1880, and in that year 76 establishments, employing 1,271 persons and producing an output valued at \$2,655,036, were in existence. In 1890 the number of establishments had increased to 189, employing 9,485 persons, and producing an output valued at \$19,114,714. The increase in this industry has been very large since 1890. No separate statement of electrical machinery exported is given in the statistics of exports for that year. In 1897 the exports of such machinery amounted in value to \$917,453. Besides this the exports of 'instruments and apparatus for scientific purposes including telegraph, telephone and other electric' amounted in value in 1897 to \$3,083,900, having increased to this amount from \$88,383 in 1880 and \$1,429,785 in 1890.

"In the electric light and power industry as reported in 1880 there were but three establishments in the United States, employing 229 persons and producing an output valued at \$458,400. In 1890 there were in the small portion of the country reported (the State of New York, the District of Columbia, and the city of St. Louis) 144 establishments, employing 2,004 persons and producing an output valued at \$4,783,224. No statement of the extent of this industry in the whole country for the census year is available, but it is stated on what is believed to be good authority that in 1892 the aggregate capital invested in this industry in the United States was not less than \$350,000,000. At the close of 1894 there were in the United States 2,124 central stations supplying electricity for light and power and 7,475 isolated plants, a total of 9,599 establishments. The capital invested in these central stations is stated to have been \$258,956,256, and the capital invested in the isolated plants, though not stated, was probably not below \$200,000,000. A conservative estimate of the number of persons employed at that time in this industry would not be under 45,000. The growth of this industry since 1894 has been steady and rapid. New central stations and new isolated plants have been put in use all over the country, and those already in use have been enlarged. The prospect of still larger growth in the future is assured."

We continue at length here the subjects and subject-matter, which are so interestingly set forth in Mr. Greeley's report, and which give an insight into the beginning and progress of some important industries made possible by inventive genius:

#### THE ELECTRIC RAILWAY.

"The use of electricity for power purposes has found its most notable development in the electric railway. This is of very recent origin. The first electric street railway in the United States was put in operation little more than ten years ago. In 1880 of the 2,050 road miles of street-railway in the United States nearly all used animal power. Electric power was not then used. Steam and the cable were used on a few miles. The number of persons then employed on street-railways was 11,687. The census of 1890 gives the number of street-railway employees as 27,434. At the close of the year 1890 it is stated that the total mileage of street-railways was 8,123 track miles, on 5,661 miles of which horses were used, the remaining 2,462 miles being mainly electric and cable. The capital invested in these roads was \$211,277,798, and 71,000 persons were employed on them. In 1894 the total mileage was 12,527, of which 7,470 was electric. The capital invested was \$648,330,755, of which \$423,493,219 was invested in electric railways. One hundred and ten thousand persons were employed on street-railways in that year. In 1896 the mileage had increased to 14,470, of which 12,133 miles were electric. The capital invested was \$784,813,781, and the number of persons employed was not less than 140,000. The total mileage of electric railways in the United States up to October of 1897 was 13,766 miles, out of a total mileage of 15,718, of which but 947 miles were horse-car lines. The total capital invested was \$846,131,691. The number of employees may be safely estimated at not less than 166,000.

"The electric railway is the best solution up to the present time of the question of the rapid transit between suburban homes and the factory or place of business in the city. It has done much to solve the tenement-house question and has brought into the market and made available for residence purposes large tracts of land which would otherwise be of little value."

#### THE TELEPHONE.

"The telephone is now recognized as a necessity of commercial life. The manufacture of the instruments has up to a very recent date been in the hands of the company controlling the original patent. Since the expiration of that patent the manufacture of telephones has become a considerable in-



dustry; but no statement as to its extent is available. The telephone in 1880 was just beginning to become commercially known. At the close of 1896 there were in the United States 967 telephone exchanges and 832 branch offices, using 536,845 miles of wire and employing 14,425 persons. The total amount stated to be invested in telephone property in 1895 was \$77,500,000.

"The investment in electric light and power plants, in electric railways, and in the telephone represents to a very large extent money paid for labor, either directly for the construction of buildings and the construction of railway road-bed, the stringing of the hundreds of thousands of miles of wire, or indirectly for the manufacture of the materials and supplies necessary. The demand for copper, largely for electrical purposes, has caused the output to increase from 60,480,000 pounds in 1880 to 265,115,133 pounds in 1890, of which nearly all was produced in the United States. In 1895 the copper produced in the United States, including that made from imported pyrites, was 392,639,964 pounds, valued at \$39,682,347. The demand for new cars for street-railways has been enormous and has stimulated largely the manufacture of these cars. The needs of the street-railways has led to the invention of new forms of fare-registers, now very extensively used, and the manufacture of these fare-registers forms in itself an industry of no inconsiderable proportions.

#### THE BICYCLE INDUSTRY.

Another industry hardly less important in its extent and in the opportunity for employment it has afforded is the bicycle industry. Though bicycles of a certain type, adapted rather for the athlete than the general public, were manufactured to a small extent in the United States in 1880, the industry was not of sufficient importance to require separate mention in the census statistics. The great development of the industry has come since 1890, as a result of the inventions in pneumatic tires made about that time; but it had grown in 1890 to be of considerable importance. In that year there were reported as engaged in the manufacture of bicycles 27 establishments, employing 1,925 workmen and producing an output valued at \$2,568,326. In addition 83 establishments were engaged in the repair of cycles. These employed 306 persons and valued the product at \$301,709.

"In 1895 more than 200 establishments were engaged in the manufacture of cycles. In February of that year the president of the National Cycle Board of Trade stated that the aggregate capital employed in the manufacture of cycles exceeded \$100,000,000 and that over 50,000 workmen were employed in this industry. The output of wheels for that year is stated to have been not less than 800,000. The industry today, notwithstanding an overproduction which has brought about a material reduction in price to the consumer, is not less than in 1895. The product in 1897 was over 1,000,000 wheels.

"In 1880 a large proportion of the cycles used were imported, mainly from England. In 1897 the exports of cycles and parts of cycles to England amounted to a value of \$2,128,491, and the total exports amounted to a value of \$6,902,736.

"Closely allied to the cycle industry are the manufacturing industries which supply to the cycle-factory the materials used in the construction of the wheels. Steel tubing for the frame, chains for the driving-gear, wood rims for the wheels, steel balls for the bearings, pneumatic tires, and saddles are all for the most part separately manufactured. New machinery for the manufacture of bicycle parts has been invented and is largely manufactured for use in this country and for export.

"Saddles, bells, cyclometers, tools for bicyclists' use, lamps, and locks for bicycles are all needed by those who use the wheel, and their manufacture requires the employment of thousands of workmen. The extent of the industry is indicated by the fact that a single company engaged in the manufacture of cyclometers claims to have sold 700,000 of these devices in a single year.

"The sale of bicycles has become an important branch of trade. In 1895 no less than 1,400 concerns in the United States are named in a trade-list, believed to be correct, as devoted exclusively to the sale of cycles and cycle supplies. Most of these employed, besides salesmen, one or more workmen for repairing. Besides these there were 848 shops making a business of repairing cycles. In addition to these over 10,000 business houses carrying bicycles as part of their stock in trade are named in the trade-list, and over 2,500 agents not having salesrooms.

#### THE TYPE-WRITER.

"Another new industry of great importance is the manufacture of the type-writer and type-writer supplies. There was no report for this industry in the census of 1880. In 1890, 30 establishments were reported employing 1,735 workmen and producing an output valued at \$3,630,126. Since that year the industry has grown very largely in the number of

workmen employed and the value of the product. In 1893 a single company employed 2,300 workmen. The exports of type-writing machines and parts for the past year amounted in value to \$1,566,916.

"There is no reliable statement available as to the number of type-writing machines in use. It was estimated in 1895 that not less than 400,000 were then in use. One firm engaged in this industry published a statement more than a year ago that in 34 office buildings in New York city, 3,426 type-writers were then in use. The use of the type-writer is practically universal among business houses and professional men. Agencies for the sale of type-writers, dealers in type-writer supplies, and schools for teaching the use of the type-writer are found in every city and large town throughout the land.

"The great industrial value of the type-writer has been, however, in the employment it has afforded, particularly to women. A bulletin of the Bureau of Education gives the number of schools teaching the use of the type-writer and its necessary accompaniment, stenography, in 1890 as 1,081, with 57,375 pupils, nearly all of them women. The census of 1890 reported that 33,418 persons were employed in the United States as stenographers and type-writers, of which 21,270 were women. In 1870 the census reported 154 shorthand writers in the United States, of which but 7 were women. The increase since the census of 1890 has been unquestionably very large, yet there is not today an oversupply of competent stenographers and type-writers, and they still command good wages.

#### AMATEUR PHOTOGRAPHY.

"The manufacture of apparatus and materials for amateur photographers is another industry of large extent, practically new since 1880. The statistics of this industry are not given separately from those relating to the manufacture of apparatus and materials for professional photographers, an industry that was in existence long before 1880. In 1880, 15 establishments were engaged in the manufacture of photographic apparatus and materials, employing 169 persons and producing an output valued at \$246,305. In 1890 the number of establishments was 70, employing 1,448 persons and producing an output valued at \$2,745,729. The industry has grown very large since 1890. In 1892 a single corporation engaged in the manufacture of apparatus and materials designed almost exclusively for amateurs had a capital of \$5,000,000. Its capital in 1884 was \$300,000. Cameras for amateurs in large variety and wide range of price are upon the market, each of them based on patented inventions of recent date. Dealers in such apparatus and materials are found everywhere, and though a statement of the present extent of the industry is not available it cannot be doubted that it is very large.

"These new industries have had a marked effect on the publishing industry. In 1880 there were in this country no journals devoted exclusively to electrical matters or to the bicycle, and two only, monthly publications of limited circulation, devoted to photography. In 1897 no less than 20 journals were devoted exclusively to electrical matters, 38 to bicycling and the bicycle industry, and 11, two of them weekly publications, to photographic interests, most of them largely devoted to the interests of amateurs. No journals devoted exclusively to type-writing are published, but to stenography, the necessary accompaniment of type-writing, 9 are devoted. Books by the hundred have been written and published on electrical matters and scores of them on photography, especially photography for amateurs. Not a few text-books on stenography are published, while nearly every cycle-manufacturer publishes for free distribution most elaborate and finely illustrated advertising catalogues.

#### CASH-REGISTER AND CASH-CARRIER.

Two industries of less extent, but of very considerable proportions, are the manufacture of the cash-register and store-service apparatus. Neither of these was in existence in 1880. In 1890, 5 establishments employing 742 persons and producing an output valued at \$1,281,500 are reported engaged in the manufacture of cash-registers. In 1895 a single corporation engaged in the manufacture had a capital of \$1,500,000, employed 1,700 men, and valued its product at \$2,000,000. The aggregate number of cash-registers in use at that time was stated to be 100,000, valued at \$16,000,000.

The cash-carrier industry has grown up mainly since 1890, the census of that year making no separate mention of this industry. No statement of its extent at the present time is available, but it is stated that in 1895 three of the leading companies in this industry had on rental in the United States not less than 30,000 cash-carrier systems. Every department store in our cities, probably without exception, uses some form of cash-carriers, and the manufacture of the apparatus employs hundreds of workmen.

#### BASIC STEEL.

"Though no separate statistics are given for the

basic steel process, by which steel free from phosphorus and therefore capable of being worked cold, is produced, there can be no doubt that this process, invented not long prior to 1880 and first extensively used in that year, has had much to do with the large increase of the production of steel and in its use for tubing and structural purposes. The production of open-hearth steel in 1880 was 100,851 tons; in 1890, 513,232 tons, and in 1896, 1,298,700 tons. A large proportion of this open-hearth steel is basic steel.

"The manufacture of iron and steel in 1880 employed 140,978 persons; its product was valued at \$296,557,685. The same industry in 1890 employed 152,535 persons and its product was valued at \$430,954,348. The manufacture from iron and steel of bolts, nuts, washers, and rivets, doors and shutters, forgings, nails and spikes, wrought-pipe, and architectural and ornamental iron and steel employed, in 1880, 18,551 persons and produced a product valued at \$39,391,906. In 1890 the same industries employed 59,694 persons and produced a product valued at \$131,383,721. The exports of iron and steel, including manufactures of iron and steel, which in 1880 were valued at \$15,133,493, increased to a value in 1890 of \$25,592,208; in 1896 to a value of \$48,670,218, and in 1897 to a value of \$62,737,687.

#### ALUMINUM.

"An industry which is growing in importance and which had no existence in 1880 is the manufacture of aluminum. This metal, which is daily finding new uses in the industrial arts, is now upon the market in large quantities at less than forty cents a pound. In 1896, 1,300,000 pounds of aluminum and aluminum alloys were produced in the United States, valued at \$520,000. In 1880 this metal was a laboratory product, costly to produce, and not to be obtained for less than \$10 to \$15 a pound. In 1883, the first year in which aluminum is reported as a mineral product, the product is reported in troy ounces, not pounds. The product for that year was 1,000 troy ounces, valued at \$875. It is produced today only by patented processes.

#### OTHER NEW INDUSTRIES.

"Nor are these all of the new industries which have grown up in the period since 1880. The graphophone, the kinetoscope, the half-tone process of photo-engraving, the chrome-tanning process, smokeless powder and other high explosives, acetylene gas, linotype-machines, and automatic weighing-machines all represent industries of very considerable importance in which millions of money are invested and many hundreds of men are employed. Many of these have been developed since the census of 1890, and no statement as to their precise extent is available. Others of earlier development are so interwoven with established industries that it is difficult to determine how much of the increase in employment and value of product is due to new inventions and what is due to normal growth of the industry.

"The development of these new industries has not been at the expense of other industries as a whole. In few industries of importance was there a decrease in number of employees or in value of product from 1880 to 1890. In manufacturing industries as a whole the capital invested increased over 120 per cent from 1880 to 1890, or from \$2,780,766,895 to \$6,139,397,785. The number of employees increased over 65 per cent, or from 2,700,732 to 4,476,884, and the value of product increased over 69 per cent, or from \$5,349,191,458 to \$9,056,764,996. The average yearly wages of employees, which in 1850 was but \$247, increased to \$429 in 1890.

"It is to be noted with respect to the new industries based on patented invention that none of them were immediately successful. The public is not quick to accept new inventions until their practical value has been amply demonstrated. The type-writer was not commercially a success until after long years of effort and the expenditure of a large amount of capital. The electric light was believed impractical and in its first installations was met by practical difficulties hard to be overcome. Only within a very few years has this light in either of its forms, the arc or the incandescent, become a light that could be depended on. Until within a very few years on those streets and in those buildings in which the electric light was used the fixtures for gas-lights have been and are even yet retained to be used in case the electric light fails. The cash-register and the cash-carrier met with serious opposition at first. It was years before the bicycle was made acceptable to the general public. The electric railway was accepted slowly, and its best type for city use, the conduit system, was first installed against the judgment of many of those believed to be best able to judge of its practical value. Even the telephone was at first believed, except by a few enthusiasts, to be nothing more than a toy.

"None of the inventions on which these industries are based were in the form in which they were first patented commercially practicable. Even if it be conceivable that the primary inventions would have been made without the stimulus of the patent system,



there would have been no inducement to inventors to spend time and money in perfecting and improving these inventions without the certainty that if made practicable and acceptable to the public their manufacture, use and sale could be controlled for a term of years through the protection afforded by patents. If a new device may be freely copied by rival manufacturers as soon as it appears upon the market, no one can afford to expend the large sums of money which are often found necessary in perfecting the invention, constructing the plant necessary for its manufacture, and bringing it before the public. It is stated that a new form of sewing-machine for a special use cost, in the preparation of dies and other machinery necessary for the economical manufacture of its parts, upwards of \$50,000 before a single machine was ready for sale. But for the fact that the manufacturers had the assurance of an exclusive right to manufacture this machine through their ownership of the patents granted for the inventions which it embodied, no such sum could have been expended, and the public would have had to be content with the inferior machines previously on the market.

"The cost of taking out the patents relating to the several industries above considered is in the aggregate a large sum. Since 1880 the number of patents granted relating to electrical matters is 28,457; relating to bicycles, 3,196; to type-writers, 1,410; to photography, 1,293. The patent office fees on each patent issued are \$35. The attorneys' fees for preparation and prosecution of the application may be reckoned at \$50. The aggregate thus expended is, for office fees, \$1,202,460; for attorneys' fees, \$1,717,800; or \$2,920,260 in all. Besides this an amount fully as much more was doubtless expended in time and money by the inventors in experimenting and perfecting their inventions before they were ready to patent.

"Inventors cannot be expected to expend such an amount of money through a disinterested desire to benefit the public, nor can manufacturers be expected to invest vast sums of money in the manufacture of new devices which may not prove acceptable to the public if rival manufacturers who have risked nothing are to share equally in the possible profits. It is only by "securing for limited times \* \* \* to inventors the exclusive right to their respective \* \* \* discoveries," as was fully recognized by the framers of the constitution, that their aid in promoting "the progress of the useful arts" can be secured.

"To the stimulus afforded by the patent office is due the creation of these new industries and the very great development of recent years in the older industries. It is to the stimulus to invention given by our patent system that the great increase in our exports is largely due, and it is on American invention, as fostered and stimulated by the patent system, that we may confidently depend for ability to maintain the high rates of wages paid to American workmen and yet compete successfully in the markets of the world with nations where the workman receives but a meager return for his labor."

#### Postage Stamp Affixer.

Alfred Sundstrom, city surveyor of Manayunk, has recently applied for a patent covering a most ingenious invention of a machine which will apply from 35 to 40 postage stamps a minute to the envelopes. Many attempts have heretofore been made to manufacture such an article, but many have been open to serious objections. They would drop stamps, apply two at a time, or sometimes utterly fail to apply any. In over-coming all these difficulties Mr. Sundstrom has been very successful, and has made an apparatus which, though simple in construction, works perfectly. The machine consists of a frame of brass, enclosing a box with a capacity of about a hundred stamps, and a cylinder, placed horizontally between the lower rear ends of the frame, containing the water supply. The box is attached to a brass rod surmounted by a wooden knob, which is allowed free vertical movement through an aperture in the centre of the upper surface of the frame. By means of levers a piece of felt is swept over the corner of the envelope when the rod is pushed down, the felt having been previously moistened by water from the cylinder, and as the depression of the rod becomes complete the mucilaged surface of the stamp comes in contact with the moistened surface of the envelope and so remains attached. The rod immediately returns to its original position through the action of a strong spiral spring which surrounds its lower half.

Sixteen thousand dollars is said to be the record price paid for a cablegram, that price having been paid for a message sent by Heniker Heaton to Australia in behalf on the British Parliament.

It is proposed to transmit electricity for power and lighting purposes from a point on the Kern river to Los Angeles, Cal., a distance of 108 miles.

### The Evolution of the Rotary Shuttle Sewing Machine.

By EARLE H. SMITH.

The rotary sewing machine, like most other inventions of modern times, has been subject to many changes and vicissitudes before arriving at its present state of perfection. Plans have been adopted, patents obtained, and machines made and sold by the hundred, only to be afterwards abandoned, the machine cast aside and the machinery for manufacturing them thrown away.

Out of all this, or perhaps we may say outside of most of it, a rotary shuttle sewing machine has been developed of a form and structure that has taken a permanent place in the trade.

It is not here proposed to take up and go into the history of all the schemes and plans which have had their day and been given up, but only to trace the evolution of this species of sewing machine, now claiming first place against all other systems and competitors, and along those fundamental lines that have led up to the present perfected rotary sewing machine of commerce.

On the main floor of the U. S. Patent Office at Washington may be seen a collection of models selected by the Patent Office for its exhibit at the World's Fair in Chicago, 1892-93, as pioneers in certain representative American inventions which have revolutionized the world.

Among those models will be found one which, while a remarkably simple and modest affair, contains the principal and basic feature, of the present rotary shuttle sewing machine, and may be considered the germ from which this machine has grown. We thus characterize the feature in question because it is fundamental in the rotary lock-stitch sewing machine. The feature in question is a revolving "loop-taker," consisting of a circular shuttle of such form and contour as to admit of having its bearings in its periphery and of rotating around its own axis. This device, originally conceived about the year 1852, was patented in 1855, and is now the controlling element in the modern rotary sewing machine.

Prior to this, the only Rotary Shuttle Machine ever essayed was one in which the shuttle had the form of a segment of a circle, and was caused to travel horizontally in a circular groove of perhaps six inches diameter, thus making a circuit of eighteen inches circumference. This arrangement carried the shuttle at one time in its circuit, six inches from the needle. As the shuttle-thread necessarily reached from the shuttle to the needle, or place of sewing, and this piece of thread was slack and loose at all times except at one instant in the revolution of the shuttle, here was six inches of slack shuttle-thread to take care of and prevent its knotting and snarling and so obstructing the operation of sewing; to control this loose thread was an undertaking of great difficulty: so great, in fact, as to present an obstacle which seemed insurmountable, for it never was satisfactorily overcome in that machine, and proved fatal to its success.

But when the idea was once conceived and put into practice in the machine first above referred to, of having the shuttle rotate around itself, all slack shuttle-thread disappeared, and the "insurmountable" difficulty vanished. In this machine the shuttle was for the first time arranged to rotate in a vertical place—now the uniform method—parallel with the needle. The machine was called the Discoidal Shuttle Sewing Machine. The inventor took out other patents in 1857, and 1858, on the same line of improvement, which were embodied in an improved machine in 1860.

Another characteristic feature of the modern rotary sewing machine is the continuous motion of both the needle and shuttle; a continuous rotary motion for the shuttle and a continuous reciprocating motion—so to speak—for the needle. These continuous motions are indispensable in a rotary machine, since without them a perfectly smooth action with the high speed now demanded is impossible.

Again, the rotary shuttle being just as much a shuttle as any other, the means of driving must be caused to lose contact while propelling it. The reason is, that the thread of the needle is required to pass completely over the shuttle, and past the means of driving it, and yet, such means must maintain connection with the shuttle so as to keep up its rotary motion uninterruptedly. The problem is easy of solution by the use of cams and springs, but such things are out of the question where a noiseless motion, and rapidity of action with minimum wear, are paramount; then only positively acting parts can be employed.

The first practical devices for accomplishing the result by positive mechanism are found in the patents above named, 1855, 1857 and 1858 and modifications of these devices are now in extensive use in

this class of machine and giving the highest satisfaction.

Experience with the rotary shuttle or loop-taker soon brought out the fact that it was desirable not only to give the shuttle a continuous motion, but to make this motion vary in speed—moving quick in one part of the revolution, and slow at another part.

In this connection a great stride in advance was taken when mechanism was incorporated for imparting varying speeds to the continuous motions of both the needle and the rotary shuttle.

Here was what may be regarded as the perfecting improvement. The introduction of this feature completed the rotary sewing machine as an integral entirety, and established its permanency as one of the many great achievements of American industry and ingenuity, destined to become universal.

#### Books and Magazines.

A LABORATORY MANUAL IN PRACTICAL BOTANY—By Charles H. Clark, A. M., D. Sc., Principal of Windsor Hall School, Waban, Mass. Cloth, 12mo, 271 pages. Illustrated. Price, 96 cents. American Book Company, New York, Cincinnati, and Chicago.

The course of botanical study here outlined is intended to give the student a general view of the subject, and at the same time to lay a foundation upon which more advanced studies may be built. The central object is the study of the life histories of plants; their modes of reproduction, manner of life, etc. The book is a laboratory manual, yet the practical studies are arranged in a brief outline classification of plants to give the pupil a definite idea of the successive steps followed by nature in the development of the plant life of the earth. The book is well balanced, gives no undue prominence to any part, and provides at all points a sufficient amount of practical work to aid the teacher in developing the subject, and at the same time to allow him to follow his own ideas in selecting lines of original work and research for his class. So pursued, the study of botany provides the means of developing habits of close and accurate observation, and of cultivating the reasoning powers that can scarcely be claimed for any other branch of national history.

We have become familiar with smokeless gunpowder, and we are aware that it does not make nearly so much noise as the old-fashioned kind. But noiseless cannon are a paradoxical novelty now seeking favor. Col. Humbert, of the French army, is the inventor and patentee of this new weapon, and the experiments made by the Hotchkiss Gun Company are said to be most promising. In some wonderful manner, not evident to the novice, the inventor contrives that the mouth of the gun shall shut automatically at the instant the charge emerges. Thus the flame, combustion and report are successfully bottled up. Thus announces London *Standard*, and it may be true, as we nowadays hesitate to marvel at new wonders. Doubtless, if this invention proves to fulfill the promises of its inventor, it will be applied to small arms also. Anything that tends to make an engagement at once decisive is in the interest of peace.

Many will be interested in the process of manufacturing the mantels, as the incandescent part of the modern gas lamps are called. The mantle is made of cotton, which is woven in the ordinary way, and then soaked in certain salts of cerium, lanthanum, thorium, yttrium, zirconium, praseodymium, neodymium and erbium, which are obtained by patented processes from the rare earth mentioned above. After drying, the cotton is burned out and the hood or mantle is ready for use. Four times the amount of light is obtained in this way than is derived from the same gas burned in the ordinary way.

The officers of the International Exhibition to be held in Turin, Italy, have offered a prize of 15,000 lire (about \$3,000) for the best invention, apparatus, system or machine devised for the application of electricity to industrial purposes. The prize is in honor of all named after Galileo Ferraris. It is open to competitors of all nations, one of the essential conditions being that it shall be shown at the exhibition and submitted there to a practical test. A committee of international authorities will be appointed to award the prize.

The little republic of Switzerland has decided to buy in its entire railway system. This includes five lines and some 2,304 miles of railroad. The cost is estimated at \$200,000,000.

A German chemist named Laughans has produced an artificial silk that is said to be non-inflammable. It has hitherto been necessary to use nitrated cellulose. This is avoided in the new process by using a solution of purified cellulose sulphophosphoric acid.



# NEW INVENTIONS.

## Combined Comb and Shears.

Perhaps some day there will be gotten up an invention whereby a man can cut his own hair in any shape or style desired. And considering the difficulty in being suited in this particular, the inventor of an apparatus for this purpose should be highly rewarded. An approach to this possibility is found in a newly patented invention, which consists of a pair of shears having a comb attached at their axis and extending along the blades to their outer extremity. The comb is held in a removable frame, and is arranged to conform to the action of the shear blades.

## Dough Cutter.

A machine that will cut dough into pieces to be made into loaves and give the same weight to each piece, is something much desired by the baker. Machines of this nature have been invented, but it seems there is usually some irregularity in the weight of loaves thus produced.

A recently patented dough cutter is one consisting principally of a cylinder with a funnel shaped end and tapering nozzle, a dough-hopper, cutting knife, a spiral conveying device, and controlling mechanism. In operating, the dough is put in quantity in the hopper where it is caught by the spiral and forced in a compact mass forward and into the nozzle; from this it passes outward and is intercepted by a cutter frame working across the nozzle, and, as the exact quantity presents itself, is cut into the proper length for baking.

This invention is by Herman Weichert, of Jersey City, N. J.

## Combined Sleigh and Carriage.

A combination carriage and sleigh is a recently patented idea, one which in a land of sudden freezing and quick thawing, might find a useful field. There are two vehicles arranged for complete and rapid changing from one kind to the other; for it is "all there" whatever the weather or the place. When there is a snowy road to be traveled, the sleigh, with its runners, braces and body, carries at the side of the latter the wheels that, when used, turn it into a carriage; these being kept on their axles, which extend into the sleigh's body, but which are pivotally adjusted, so the wheels can be at will moved into or out of position as occasion may demand. When a carriage ride is desired the wheels are lowered and rigidly fixed in position, the runners raised from the ground, and circular motion begins.

## Electric Tooth-heater.

A new use for the electric current is suggested in a recent patent for an electric probing and heating apparatus to be used in drying canals in the roots of teeth. In applying this heat to the tooth root the probe used for the purpose is connected with a wire loop of high resistance, which forms part of two wires that make an electric circuit. This loop first passes through a handpiece, and is lashed with an insulating wrapper to near its outer extremity. The probe is made flexible, so as to easily follow crooked channels in the roots of the tooth.

## Fog Dispeller.

A patent for an apparatus for dispelling fogs, has lately been granted. This is for "raising the wind" by means of machinery, and sending it forth to blow away the vapor. A tube is mounted on a ship's deck, and secured upon a stand so as to point in any desired direction. It is connected by a pipe with an air machine located in the hold of the ship, and when power is turned on, fires its continuous charge at the vaporous enemy. At the end of the tube there is attached a flange, which projects forward and prevents the induction of outside currents. Horatio N. H. Ingrin, of Worcester, Mass., is the inventor and patentee of this fog gun.

## Nailless Horseshoes.

It would be a good thing if shoeing horses by driving nails into their feet could be entirely done away with. In this reform the inventive genius of John C. Johnson, of Nannie, Ga., comes forward for its bid for public recognition, with a shoe for the horse, which is kept on the equine foot, without nails. For this straps projecting from the horseshoe are used with other attachments. These consist of eye-bearings, at the ends of the straps; bails pivotally mounted in the bearings; a hasp

connected with one bail, a latch-lever to the other, and a locking device in form of a hook, mounted on one of the bails and adapted to engage and bolt the latch-lever. Thus the shoe is strapped and locked to the horse's foot—which no doubt the animal will be better satisfied with than to have its feet driven full of nails.

## Bee Catcher.

Those who are acquainted with the habits of the busy bee know that at swarming time these little workers gather in great numbers on trees and other convenient places and there, clinging together, form large knots of buzzing, squirming insects. At this performance it is necessary to get them into their proper hives, for which work much careful maneuvering is required on the part of the apiculturist. For effectively gathering in the bees an apparatus has been invented and patented by Edward Arrington, of Wilkesville, Ohio. It consists of a hopper-shaped receptacle pivotally mounted at the end of a pole and having its sides and top and bottom composed of wire netting. When bees are to be gathered, the trap is pushed up under them and they are made to fall into this, after which a sliding door, controlled by cords by the operator, is pulled over the mouth of the receptacle, and the bees are safely carried en masse to their intended homes.

## Car Replacer.

The recently patented invention of Levi W. Olmstead, of Galeton, Pa., will make the replacing of derailed cars upon the track less difficult. The apparatus to be employed for this purpose is very simple and easily managed. It consists of a wedge-shaped block of wood covered with metal and having at its higher end a revolving cone-shaped roller. The thick portion of the block lies even with the top of the rail, from which it slopes to the ground so that the wheels of the car come easily upon it, moving gradually upward until the top is reached. At this point the cone-shaped roller is encountered, and by its lateral motion the car wheel is switched to the rail.

## Mailing Box.

A new invention for the prevention of breakage of vessels containing liquid to be sent through the mail has been recently patented by Charles W. Lovell of Brooklyn, N. Y. In this a papier mache outer covering is employed, made in two sections, comprising a body portion and top which fits into the former and is held there by a spring catch. The bottle or other receptacle to be sent fits into the case and is surrounded by fibrous absorbent packing for taking up the liquid in case of breaking, and also for forming a cushion for preventing this accident.

## A New Tire.

With the vast number of inventions concerning bicycles it seems that the wheel should have long ago reached perfection—if such is possible. But the inventive idea in this line seems to be unceasingly prolific. One of the new ideas for the benefit of the wheelmen is a pneumatic tire intended to prevent the complete collapse of the inflated tube when puncture occurs. This is accomplished by having arranged at certain intervals with the tire a series of radiating partitions, each of which contains an orifice covered by a valve held in close contact by a spring. When the air is pumped into the tube at the general supply valve it forces open the smaller position valves, which close tightly when the tire is inflated, making each partitioned section independent of the others; so that when there is a puncture the wheelman can still ride on and repair damage at leisure. This invention was patented by William J. Lanigan, of Duluth, Minn.

## Hall Ventilator.

A good, convenient means for ventilating halls and churches, has been invented and patented by Samuel H. Woodbridge, of Brookline, Mass. This consists principally of horizontal air-ducts arranged beneath the seat and in connection with their bottoms. From the latter a short air-shaft extends downward through the floor, thus affording a supply of fresh air without bringing it into immediate contact with any of the congregation, as is the case where an air-duct terminates at the inner wall or floor surface.

## Combined Knife and Scale.

A patent was lately issued for a combined knife and weighing-scale. In this the knife blade is normally open, and the scale mechanism is placed in

the handle. The former comprises a spring actuated bar, with the spring depending from the upper portion of the knife, while at the side of the handle where a portion of the latter is cut out, the scale marks are visible. This scale-knife—the invention of Frank H. Hopler, of Philadelphia—should be a most convenient adjunct to the implements used by the butcher, grocer and others who have much cutting and weighing to do on a "small scale."

## Views on Pending Patent Legislation.

Mr. Jerome Carty of Philadelphia, when in Washington recently, on being interviewed on the subject of pending patent legislation, expressed the following views:

"The subject-matter of the revision of the laws relating to the granting of patents and providing more ample accommodation for the growth of this branch of the government ranks among the most important subjects from an administrative point of view now pending before congress.

It is my belief that the subject-matter of copyright bills and trade-mark bills should be left to the various bodies and associations which have heretofore given so much time and attention to this subject. Copyrights, being entirely under the jurisdiction of the Librarian of Congress, should certainly be eliminated from consideration by the Patent Law Association; and as to the subject-matter of the revision of the trade-mark law, inasmuch as the jurisdiction of the congress of the United States upon this subject has references only to the territories of the United States, the District of Columbia and foreign countries can also be safely entrusted to the various bodies who have heretofore given much time and consideration to this subject. The revision of the patent laws is in itself so great and important that in order to bring about radical and desired reforms will require much time, deliberation and influence.

First, in regard to Section 482 of House Bill 6650, referring to the requirements to render one eligible to be an examiner-in-chief—that they shall be persons of competent legal knowledge and scientific ability—is in my opinion exceedingly vague and indefinite. It would appear to me that to be a person of competent legal knowledge and scientific ability, should require a certificate of admission to the bar of some competent tribunal, and in addition to this a certificate of graduation from some school or college entitled to respect and consideration. The entire section is vague and would seemingly place into the hands of the examiner-in-chief plenary powers quite ample with the powers of the Commissioner which would undoubtedly bring about delay and confusion. One of the radical deficiencies of the present system in the United States is the expense and delay incident to interference cases, without giving the successful parties any greater *prima facie* rights than they would acquire by the allowance of a patent directly by the primary examiner. The thought which I desire to impress upon the Association as well as upon congress is, to take away all intermediate proceedings of a quasi-judicial character and let all such questions be decided by the circuit courts of the United States, or to organize in connection with the patent office a judicial tribunal composed of men of legal, mechanical and scientific experience whose decisions on all questions of law and fact involving inventions should be conclusive, subject only to appeal to the circuit courts of the United States or directly to the Circuit Courts of Appeal as now constituted. This would leave the commissioner and other heads and chiefs of departments ample time to pass upon and dispose of the routine business of the office.

I notice that House Bill 7083 is intended to cover the establishment of a patent court, and in this regard it may not be inappropriate or invidious to suggest that which occurs to every patent lawyer of experience, viz:—that after a patent is granted, with or without an interference, the subject-matter sometimes covering the most intricate questions of science and mechanics is heard, argued and determined before judges who necessarily have had comparatively little experience on these subjects.

I have not had time to examine the pending laws in detail, but would hereafter be glad at any time to take part in any work looking to the thorough revision of the existing laws. The recent action of the patent office resulting in the establishment of a rule as to the character and competency of people practicing before it is certainly a great stride in the right direction.

Dr. Von Welsbach, the Austrian chemist who invented the incandescent gas burner now so much in use, has taken out patents on an electric lamp operated on a similar plan.

Ball-bearing roller skates is a late invention, by Samuel L. Schwartz of New York.

There are 2,291 war-ships in the navies of the world.



## International Association for the Protection of Industrial Property.

BY MAX GEORGIH.

In connection with the Conference of the International Union for the Protection of Industrial Property which assembled at Brussels on the 1st of December, 1897, it may be interesting and pertinent to give a brief account of the association bearing the name which heads this review, for the reason that this association, although private and self-constituted in character, has nevertheless had an influence, not to be underrated, on the Brussels' Conference, and, also because the same was founded with the sanction and hearty approval of the officials administering the business of the Official Bureau of the International Union at Berne.

From a partial list of the members, to be given further on, whose number includes a great proportion of the representative men and legal and technical authorities of Europe, in the field of patents and other forms of industrial protection, it will be seen that this society constitutes a factor of great importance and one which must be dealt with, and taken into serious account, in the future efforts of the United States to obtain reforms in industrial protection.

A short statement of the history of this association will be proper at this point.

The first earnest measures for the organization of this International Association were adopted at the German-Austrian Conference which took place at Berlin from the 5th to the 8th of October, 1886.

This conference was called by the German and Austrian Associations for the Protection of Industrial Property, whose purpose, within the limit of their respective countries, is identical with the objects of the International Association, both being founded for the purpose of developing and perfecting the industrial protection with a view to their own countries, and an ultimate international unification of these for these purposes.

The German association was founded on the 19th of December, 1891, and the transaction of this society will be found in *Seitschrift für gewerblichen Rechtsschutz* for the years 1891 to 1895, and, thenceforth, in the official organ "*Gewerblichen Rechtsschutz und Urheberrecht*" published at Berlin by Dr. Albert Osterrieth, the secretary.

The Austrian association dates its existence from March 1894, and its transactions are published in "*Oesterreichische Zeitschrift für gewerblichen Rechtsschutz*" published at Vienna by Victor Karmin.

The German-Austrian Conference, referred to above, was convened primarily for the purpose of developing closer relations between the two countries with regard to industrial protection, but its activity reached far beyond these narrow confines and, as its published proceedings (Berlin, Karl Heymann, Publisher) show, the great bulk of the discussions and papers read, related to the question of international protection and the International Union for the Protection of Industrial Property, concluded at Paris, March 20, 1883.

Both associations are friendly to the International Convention and to an early accession to the same, and, since their members include a great proportion of the leaders of industry, in these countries, as well as many high officials connected with their patent offices, it is not unreasonable to suppose that the accession of these countries may be looked for at a not distant date. In fact, Austria, as expressed by one of the members of the Austrian Association (Karmin), is unanimously for the International Convention.

As stated above, the idea of forming an International Association was first broached at the German-Austrian Conference, Dr. Osterrieth making a motion to this effect (see proceedings of the German-Austrian Conference, page 68). He was ably and eloquently supported and seconded by Dr. Richard Wirth, one of Germany's foremost authorities in the field of industrial protection. The motion was carried unanimously, and it can be said that the same received the official sanction of the patent authorities of Austria and Germany, since both were strongly represented at this conference.

Prior to the Congress, Dr. Osterrieth had conferred personally with Messrs. Morel, Poincard, the Director and Secretary of the Berne Bureau of the International Union, and also, with Messrs. Pouillet and Maillard, the former of whom is well known as the author of the leading text-books on the French Patent Law and kindred subjects, and both for their active participation in all matters relating to the International Convention, and to the Association Literaire et Artistique (International Copyright As-

sociation), an association to regulate the international protection of literary property and copyright.

From all these Dr. Osterrieth obtained the hearty approval of his project. He, moreover, personally traveled to Berne and London and met the gentlemen connected with the Association Literaire et Artistique, such as Messrs. Maillard de Marafy, George Maillard, Leon-Caen of Paris, Amar and Bosio of Italy, Sir Henre Roscoe, Mundella, Abel, Carpmal and Alexander Siemens of London, and George De Ro and Wauvermans of Brussels; all of these men, who are well known in the world of science and industrial protection, heartily concurring with his proposal.

The idea of this association, it will hence be seen, not only received the support of representative men, but also, the official sanction of the International Bureau at Berne. It also obtained the endorsement of the official organ "*La Propriete Industrielle*" (See e. g. Vol. 13, No. 6 of June 30, 1897 of this publication.)

At the close of the discussions at the Berne Conference, Dr. Osterrieth was informally charged with the arranging of the preliminary steps for a provisional congress to be held at Brussels, and of inviting prominent men, interested in the matter, to meet for the purpose of organizing the proposed association.

A provisional committee was then formed consisting of the following men, arranged according to countries:

Germany—Dr. C. A. Martius, director of the *Aktiengesellschaft für Anilin-fabrikation*, Berlin; Julius von Schutz, director of *Frederich Krupp-Gruson Werke*; Wilhelm v. Siemens of *Siemens & Halske*; Dr. Richard Wirth, patent attorney, at Frankfurt-on-main; Carl Fehlert, patent attorney, at Berlin.

Austria—Dr. Wilhelm Exner, professor and director of the Imperial and Royal Technological Museum at Vienna; Victor Karmin, patent attorney, Vienna.

Belgium—Charles Spinael, president of the Chamber of Commerce, Brussels; Georges De Ro, attorney at law, Brussels, delegate at the Brussels Conference.

France—LeComte Maillard de Marafy, author of *Le Dictionnaire de la Propriete Industrielle* and Director of the French Manufacturers Society for the International Industrial protection; Eugene Pouillet, attorney at law and author of a number of important text-books and commentaries on patent law and industrial protection; George Maillard, attorney at law.

Great Britain—The Right Hon. A. J. Mundella, M. P.; Sir Henry Roscoe, the noted chemist; Edmund Carpmal, patent attorney and writer of text-books on patent laws.

Italy—Moise Amar, lawyer and Professor of Industrial Law at the University of Turin. Edoardo Bosio, lawyer, author of a commentary on Italian patent law and publisher of the foremost review on the subject of industrial protection.

Hungary—Dr. Isidor Deutsch, lawyer, Budapest.

This list, together with the names of the officials of the Bureau at Berne, Messrs. Morel, Poincard and Frey-Godet, may serve as a partial list of the present members of the association.

Dr. Osterrieth, moreover, drew up preliminary rules and by-laws and submitted them to Messrs. Morel and Poincard of the Berne Bureau, who revised them and, in their revised form, they were submitted to the preliminary conference at Brussels, held May 1897, and there adopted. They were drawn, so far as practicable, after those governing the International Copyright Association.

At the Brussels preliminary congress it was decided to hold the first regular congress at Vienna.

The Vienna Congress took place from the 2nd to the 7th of October 1897. As will be seen from the resolutions adopted the entire field covered by the International Convention was drawn into discussion.

The program for debate adopted was as follows:

1. Trade and Merchandise Marks; their International Registration.
2. The protection of Designs and Industrial Models; its international importance.
3. The protection of inventions.
4. Indications of origin.
5. Unfair competition.

The proceedings were outlined and followed the course indicated by the general report submitted by Mr. Georges Maillard, who at Brussels had been charged with the preparation of this document. This report is a very valuable contribution to the literature on the International Convention and should always serve as a valuable work of reference. Besides this general report a large number of special reports from the various countries represented at the Congress were presented, many of them excellent exposes of the subjects treated.

The work of the Vienna Congress resulted in the following resolutions which I have translated from the German text:

## PART I.—THE CONVENTION OF THE INTERNATIONAL UNION FOR INDUSTRIAL PROTECTION.

1. The International Union for the industrial Protection is necessary for a uniform shaping and development of national legislation, for a practical realization of the well founded rights of inventors and commerce and for safeguarding fair international business relations.

2. It is desirable that the number of countries adhering to the International Union shall increase and particularly that the intention of Austria and Hungary to enter the Union will be carried out, and that Germany and Russia will not defer too long their accession to the same.

## PART II.—WAYS AND MEANS FOR DEVELOPING THE UNION.

1. The Board of Managers shall continue the organization of executive committees in all those countries where an interest in the accession to the Union exists. Each of these executive committees shall prepare at an early date a report as to the present situation of the country which it represents and as to the proper means to be adopted to bring about the adhesion of the same to the Union. For these countries for which no executive committee can be appointed, the executive committee of another country or a proper member of the board of managers is to be charged with the preparation of such report and to follow the growth of sentiment in this respect. The board of managers shall lend its support to the various committees, report at the Congresses as to the means adopted, submit the reports from the various countries and suggest further methods of proceeding which may seem advisable.

2. The executive committees shall immediately take the necessary steps to induce the governments of their respective countries to take part officially at the Brussels Conference, and they shall, if necessary, receive the assistance for this purpose of the board of managers.

## PART III.—PROPOSALS FOR THE COMING CONFERENCE FOR REVISION TO BE HELD AT BRUSSELS, DEC. 17, 1897.—GENERAL PROVISIONS—EQUALITY OF SUBJECTS AND CITIZENS OF COUNTRIES NOT MEMBERS OF THE UNION.

It is desirable that Paragraph 3 of the Convention be changed to read as follows:

Citizens or those belonging to a country not in the Union shall be put on an equal footing with subjects or citizens of countries within the Union if they are residents of or have their principal industrial or mercantile establishment in the territory of one of the countries within the Union.

Abolition of the periods of priority specially provided in favor of countries beyond seas.

It is advisable to abolish the periods of priority (one month *in addition* to the general periods of priority M. G.) specially established for countries "beyond seas" by Paragraph 4 of the Convention.

Means for holding the countries of the Union to the performance of the duties imposed by the Convention.

It is desirable that the Brussels Conference express the desire that the countries within the Union amplify at the earliest practical date their laws in the various departments of industrial protection and make them agree with the provisions of the Convention.

## 1. TRADE-MARKS; THEIR INTERNATIONAL REGISTRATION—PERIOD OF PRIORITY.

It would not entail injury if certain countries would insist upon fixing the period of priority for trade-marks according to the following:

The period of priority for trade-marks begins with the date of the first application and ends three months after the registration effected upon such application.

## ADMISSABILITY OF TRADE-MARKS AS REGISTERED IN THE COUNTRY OF ORIGIN.

Article 6 of the Convention is to be changed as follows:

"Every trade-mark which has been registered in due form in its country of origin shall be admitted to registration in all other countries of the Union without change, even if it cannot be considered a trade-mark according to the internal laws of such countries, it shall be considered the country of origin the country wherein the applicant has his principal establishment. If the main establishment is not located in one of the countries of the Union the country to which the applicant belongs shall be considered the country of origin.

Registration may be refused if the trade-mark is contrary to public order or good morals.

Such trade-marks as contain public coat-of-arms or honorary decorations may be considered as opposed to public order.

The executive or judicial authorities which in each country have jurisdiction shall decide all questions relating to the priority of the trade-mark; however, the date of the acquisition and the question as to the maintenance of the trade-mark are to be determined by the laws of the country of origin. The subsequent acquisition of the same trade-mark by one or more business men of another country, can not effect the rights of the first owner, unless such later acquisition occurred in good faith in a country in which the originally registered trade-mark was not known.



## PROSECUTION OF TRADE-MARK INFRINGEMENTS.

Article 9 should receive the following additions :

In those countries whose laws do not provide for a seizure of imported goods bearing infringing trade-marks, prohibition of such imports is to take the place of confiscation.

In those countries whose legislation does not admit of seizure within the country, such seizure is to be replaced by such legal means as are available to the authorities by virtue of the laws.

The authorities shall not be required to effect a seizure of exported goods.

## INTERNATIONAL RESTRICTION OF TRADE-MARKS.

Classification of Commodities :

It is desirable that an international system of classification of merchandise be established.

Effects of international registration in case of a prior registry in separate country.

After Article 4 of the Madrid Convention there should be inserted a new article as follows :

If a trade-mark has already been registered in one or more of the countries under this Convention and the same is subsequently registered internationally in the name of the same proprietor or his assignee, such international registration is to be considered as taking the place of the prior registries in the separate countries, without, however, interfering with the rights acquired by virtue of the latter.

## EXTRACTS FROM THE INTERNATIONAL REGISTER.

The International Bureau should be authorized to furnish to anyone upon application and on the payment of a fee to be determined, a copy of the entries contained in the international register with respect to any trade-marks.

## INTERNATIONAL FEES.

The Congress expresses the desire that the fee provided by Article 8 of the Madrid Conference be reduced as much as possible, particularly in case of the concurrent registration of several trade-marks for the same proprietor.

## PART II.—INDUSTRIAL DESIGNS AND MODELS.—PERIOD OF PRIORITY.

It would not be incompatible with the rights of all concerned if the following provisions were inserted in the Convention :

The period of priority for industrial designs and models begins with the first application and ends three months after registration.

## IMPORTANCE OF DESIGNS MADE IN ANOTHER COUNTRY.

To paragraph 1 of Article 5 of the Convention the following words should be added :

The same provision applies to industrial designs and models.

## COMPULSORY WORKING.

To Article 5 a further paragraph is to be added as follows :

No design or model which is the property of anyone belonging to one of the countries within the Union shall be declared void in any of the other countries of the Union by reason of default of manufacture of the same.

## FORMALITIES IN THE DEPOSIT OF DESIGNS IN THE COUNTRIES OF THE UNION.

It is to be desired that the industrial designs and models admitted to protection pursuant to Articles 2 and 3 of the Convention shall be protected in all of the countries under the Union without any further formalities than those which are prescribed and have been complied with in the country of origin.

The country of origin shall be determined by paragraphs 2 and 3 of Article 6.

The method by which the originator of a design or model shall, in the case of litigation, prove the compliance with the required formalities in the country of origin and the identity of the design or model, shall be governed by rules to be issued with the assent of the governments.

## PART III.—PROTECTION OF INVENTIONS.—REVISION OF ARTICLE 4 OF THE CONVENTION.

I. Paragraph. It is advisable to cancel the words "reserving the rights of third parties."

II. Paragraph. It is advisable to cancel the words "on the part of a third."

The following passage should be added after paragraph 2 of Article 4 of the convention :

The right of priority may be claimed by the legal successors of the first applicant for a patent or an industrial model or design.

## COMMENCEMENT AND DURATION OF THE PERIOD OF PRIORITY.

The date of the application for a patent should be retained in the Convention as the starting point for the period of priority and the latter should be extended to one year.

## MUTUAL INDEPENDENCE OF PATENTS.

It is recommended that a provision to the following effect be inserted after Article 4 :

The patents applied for in the several contracting countries by parties within the Union are independent in their duration of patents for the same invention in other countries, whether these countries belong to the Union or not.

This provision applies also to such patents as exist at the time of its taking effect.

The same rule applies with complete reciprocity to the existing patents of new countries acceding to the Union from the time of accession.

## COMPULSORY WORKING.

It is recommended that Paragraph 2 of article 5 of the convention be changed to read as follows :

A patent granted to a party belonging to the Union shall be declared void for failure to work the same in the country in which it has been granted only in case the owner of the patent, after three years from the date of the grant of the patent refuses to grant a license based on an adequate consideration and demanded by a manufacturer whose principal establishment is in the said country.

## EXPOSITIONS.

The following paragraph should be added to Article 11 of the Convention :

The applications for temporary protection shall be published by the International Bureau, pursuant to Regulations which are to be drafted by joint Governments and which may be revised independently by the Conference of Revision.

## PUBLICATIONS OF PATENTS APPLIED FOR AND GRANTED IN THE COUNTRIES OF THE UNION BY THE BUREAU AT BERNE.

The following article should be added to the Convention :

The Bureau of the International Union shall publish at regular intervals a classified catalogue of all the patents granted in the various countries, and distribute such catalogue in sufficient quantities among the several countries of the Union.

## UNIFICATION OF THE FORMAL REQUIREMENTS EXISTING IN THE VARIOUS COUNTRIES OF THE UNION WITH RESPECT TO THE FILING OF APPLICATIONS FOR PATENT.

It is desirable that the Conference at Brussels authorize the International Bureau to prepare a project for a unification of the formal requirements in force in the countries of the Union with respect to the filing of applications for patents, as well as the classification of patents, and that the Swiss Federal Government agitate for the calling of a conference of the various Governments for the purpose of examining such project.

## PART IV.—INDICATIONS OF ORIGIN.

It does not seem desirable to modify the passage of the existing conventions with reference to this subject matter.

## V.—UNFAIR COMPETITION.

The following new provision should be added to the Convention :

Parties belonging to any country within the Union (Art. 2 and 3) shall enjoy in all of the Union-countries the protection afforded to citizens against unfair competition.

A comparison of these resolutions with those adopted at the Brussels Conference of December 1897, cannot fail to show that the labors of the Vienna Congress have had their effect upon the conclusions reached at Brussels or at the very least that the same minds which have been active at the deliberations of the former participated successfully at the official conference.

Thus the very important and most desirable Article 42, whose addition to the Convention is urged by the first final protocol of the Brussels Conference and which establishes the international independence of the duration of patents granted for the same invention, is almost literally adopted from the Vienna Resolutions.

This is only one of many examples.

It is to be observed, moreover, that the work of the Brussels Conference is not yet completed, and that a number of important questions are to be finally agreed upon at a future second session.

At this second session I have reason to believe that a series of propositions set up at the Vienna Congress, notably with regard to the all-important Article 4 of the Convention of 1883, will be maturely considered and I believe that the prospects are fair that they will be adopted in part, at least.

These propositions seem to me to argue in favor of an active participation of Americans in the International Union for the Protection of Industrial Property. It is, indeed, true that the United States are interested in, and probably, entitled to greater concessions than accorded in the Resolutions adopted. It must be admitted, also, that the protection for industrial property in many foreign countries is often coupled with hardships, annoyance and conditions impossible to fulfill. But, on the other hand, it should be observed that the trend throughout the world is toward greater liberality to inventors and industrials of all nations and the more effective encouragement of invention from whatever source it may come. And this tendency in each country, to adequately and substantially reward invention and industrial merit, independently of the country where they may be found, is in a great measure the outcome of the International Convention which has drawn into closer relationship, not only the countries forming part of the Union, but, indeed, every other industrial country of importance on the globe.

It will be well for us to come into more intimate contact with foreign patent practitioners and industrials, to meet them in their councils and to participate with them in their deliberations by writ and by word. We will find them well equipped with a knowledge of patent and cognate matters, not excluding those of our own country.

In order to secure more advantageous terms for our inventors and manufacturers we must enter into active co-operation and closer rapport with the inventors and manufacturers throughout the world, and to effect this purpose there is, in my opinion, no better medium offered than the International Association for the Protection of Industrial Property.

Its Board of Managers is the following : President, Sir Henry Roscoe, F. R. S., London. Vice-presidents, Alexander Siemens, London; Eugene Poillet, Paris. Chancery Counsellors, Dr. W. Exner, Vienna; Dr. C. A. Martin, Berlin. General secretary, Dr. Albert Osterrieth, Berlin. Treasurer, Director von Schuz, Berlin. Conferees, Germany, Dr. Edwin Katz, Berlin; G. Fehlert, Berlin; G. Glafey, Nuremberg; Austria, Counsellor of Com-

merce Hoeft, Vienna; Dr. Maresch, Vienna; Victor Kaman, Wein; Belgium, Ch Spinnael, Brussels; Denmark, Prof. Torp, Copenhagen.—Spain, F. Elzaburu, Madrid; United States, Max Georgii, Washington; France, Armengaud jeune, Paris; Perisse, Paris; Expert Besancon, Paris; Great Britain, Ed Carpmal, London; R. W. Wallace, Q. C. London; Hungary, Dr. Isidor Deutsch; Dr. Franz Heltai; Dr. Eugen Wagner; Italy, Moise Amar; Eduardo Bosio; Norway, Carl Lundh, Christiania; Netherlands, Prof. Dr. Jitta, Amsterdam; Russia, Fr. Kaupé; Sweden, Bruhn, Stockholm; Switzerland, Col. Huber-Wordmuller, Zurich. Secretaries, Maximilian Mintz, Berlin; Dr. Jakob Wochsler, Vienna; Paul Wauwermans, Brussel; Max Botton, Paris; Georges Maillard, Paris; Lucien-Brun, Lyon; Paul Ocker, San Francisco (Paris); J. F. Iselin, London; Charles Dumont, Luxemburg; Mano Keleman, Budapest; Carle Barzano, Italy; Claus Hoel, Christiania; Alexandre Pilonke, St. Petersburg; E. Imer-Schneider, Geneva.

## Railroad to the Yukon.

A contract has been let for the opening of a rail and river route to the Yukon, and if the pledges of the contractors can be fulfilled, one hundred and fifty miles of railroad will be in operation by September 1 of this year. The proposed route is as follows : By ocean steamer to the mouth of the Stikkeen River, near Fort Wrangel, Alaska; thence by river boats up the Stikkeen River to Telegraph Creek; thence by railroad to the head of Teslin Lake—a distance of 150 miles. From this point a line of steamboats will run up the lake to the point where it discharges itself by the Hootalingua River into the Yukon.

The survey carried out by the Canadian Department of Railways showed that the Stikkeen River is navigable for 150 miles from the sea, and it was estimated that a powerful steamer could make the passage to Telegraph Creek in two days. The cost of a steam railroad from this point to Teslin Lake is estimated at \$4,000,000. The government engineer also sends in an estimate for an electric road 165 miles in length, which he states could be built for \$2,850,000. Teslin Lake, which is 61 miles long, was found to be open for navigation on May 18, and froze over again on October 27.

The construction of 550 miles of railroad involving heavy excavation in such a remote country and within such a limited period seems to be a formidable undertaking, especially when the rigorous nature of the climate is considered. Nevertheless, it is a fact that there were several syndicates who were anxious to secure the valuable monopoly. The successful parties are Messrs. Mann and Mackenzie, two of the wealthiest and most experienced contractors in Canada, and it is likely that they will prove equal to the task. The government is to make a land grant, consisting of 25,000 acres of Yukon land for every mile of railroad built, or 3,750,000 acres in all. The land is to be taken in sections of eighteen square miles, alternate sections being reserved as public domain. In making its selections, the company must not infringe upon the rights already acquired by the miners.—*Scientific American*.

## Machinery Widens Employment.

Machinery has widened employment most effectively by stimulating the growth of new industries, and we ought not to underestimate its effect in this direction, since it has an important bearing on the general question. Improvements in printing presses had a direct effect in extending the use of books and newspapers, and, therefore, in expanding the paper and printing industries. The development of railways, steam and electrical, in themselves simply the substitution of travel and cartage by machine for the old methods by horse and foot, has given employment to thousands where hundreds were employed before.

The invention of the typewriter has practically destroyed the profession of pen copyist, but many persons now find employment through the widely extended use of the machine. The application of electricity in the telegraph and telephone, and in numerous other directions requiring complex mechanical appliances, has in recent years created industries that previously had no existence. Prior to 1880 the manufacture of electrical apparatus and appliances was not of sufficient importance to be separately presented in the census reports. In that year the average number of employes engaged in the industry was but 1,271, rising in 1890 to 8,082.

The development of photo-lithography has almost superseded the old processes of block engraving, but in photography, photo-lithography, and photo-engraving as distinct branches there were more than 8,000 persons employed at the date of the latest census.—*Donahoe's Magazine*.



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### Cushion-Keys for Typewriters.

Any person who manipulates a typewriter will, if he tries them, give a hearty endorsement of an attachment known as the cushion-key. These keys are made of rubber, with metallic rims, properly lettered and fit over the ordinary key. They yield gently to the touch and afford great relief to the finger-tips. They preserve the alignment of the type, prevent the puncturing of the ribbon and produce altogether better print than the ordinary rigid, non-elastic keys. The agent in Washington is Mr. Wm. H. T. Fowle, Washington Loan and Trust Building, the factory in Newark, N. J. This invention came out about a year ago and has been an immense success.

Senator Platt has proposed an amendment to the sundry civil bill to afford relief in the patent office as follows:

"For additional force for the patent office to enable the commissioner of patents to revise and perfect the classification of subject matter of all letters patent and printed publications in the United States patent office; for four principal examiners at \$2,500 each; four first assistant examiners at \$1,600 each; eight third assistant examiners at \$1,400 each; eight fourth assistant examiners at \$1,200 each; four first-class clerks; four copyists at \$900 each; six laborers at \$600 each; six assistant messengers and six messenger boys at \$360 each; in all, \$62,880."

READERS of the INVENTIVE AGE will find some new and valuable features in the next and succeeding issues of this magazine.

AN exhaustive review of pending measures in congress in relation to patents will appear in the April issue of the INVENTIVE AGE.

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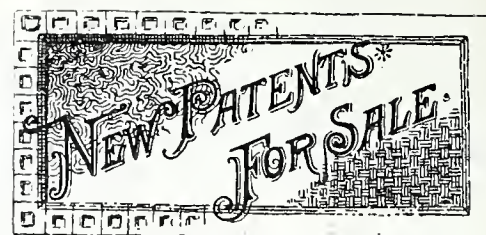
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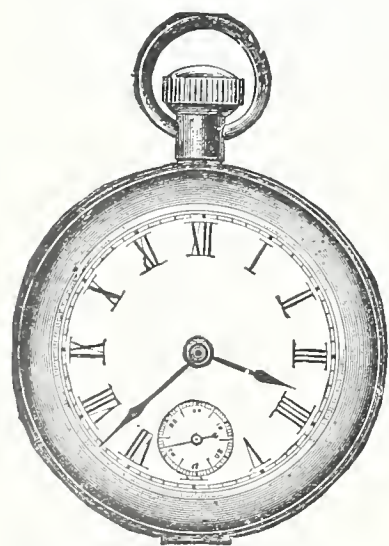
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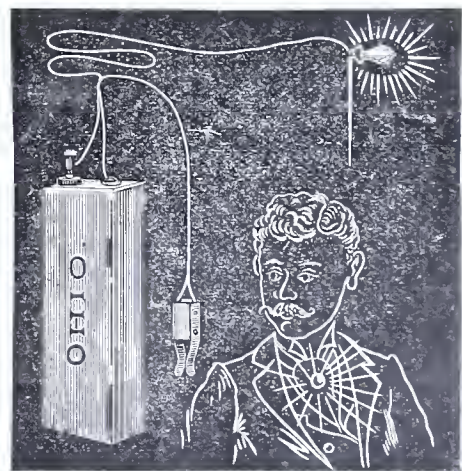
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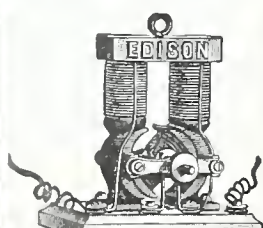
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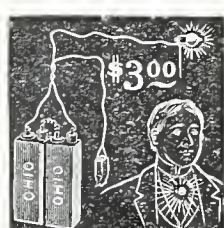
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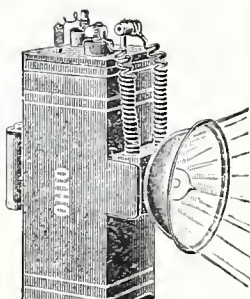
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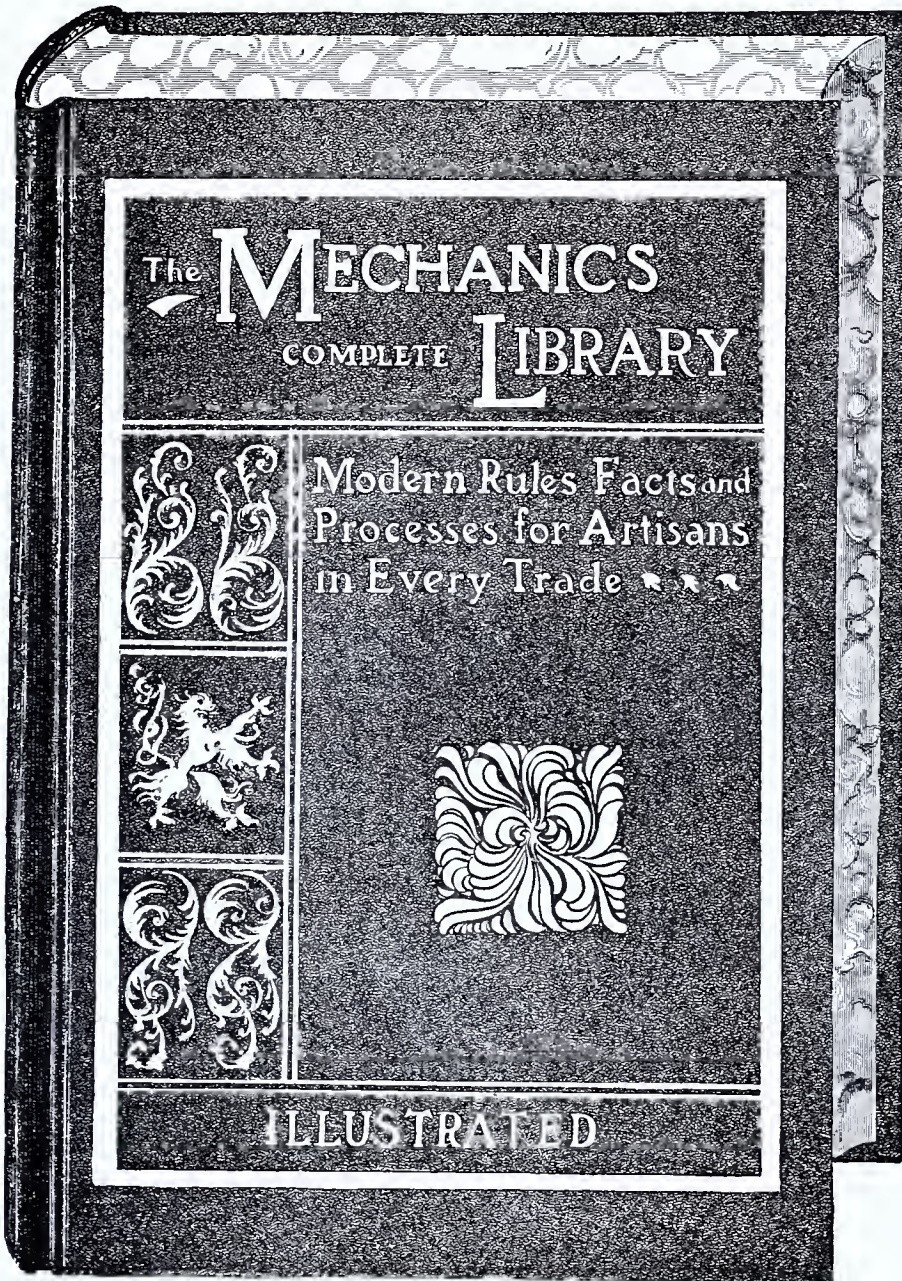
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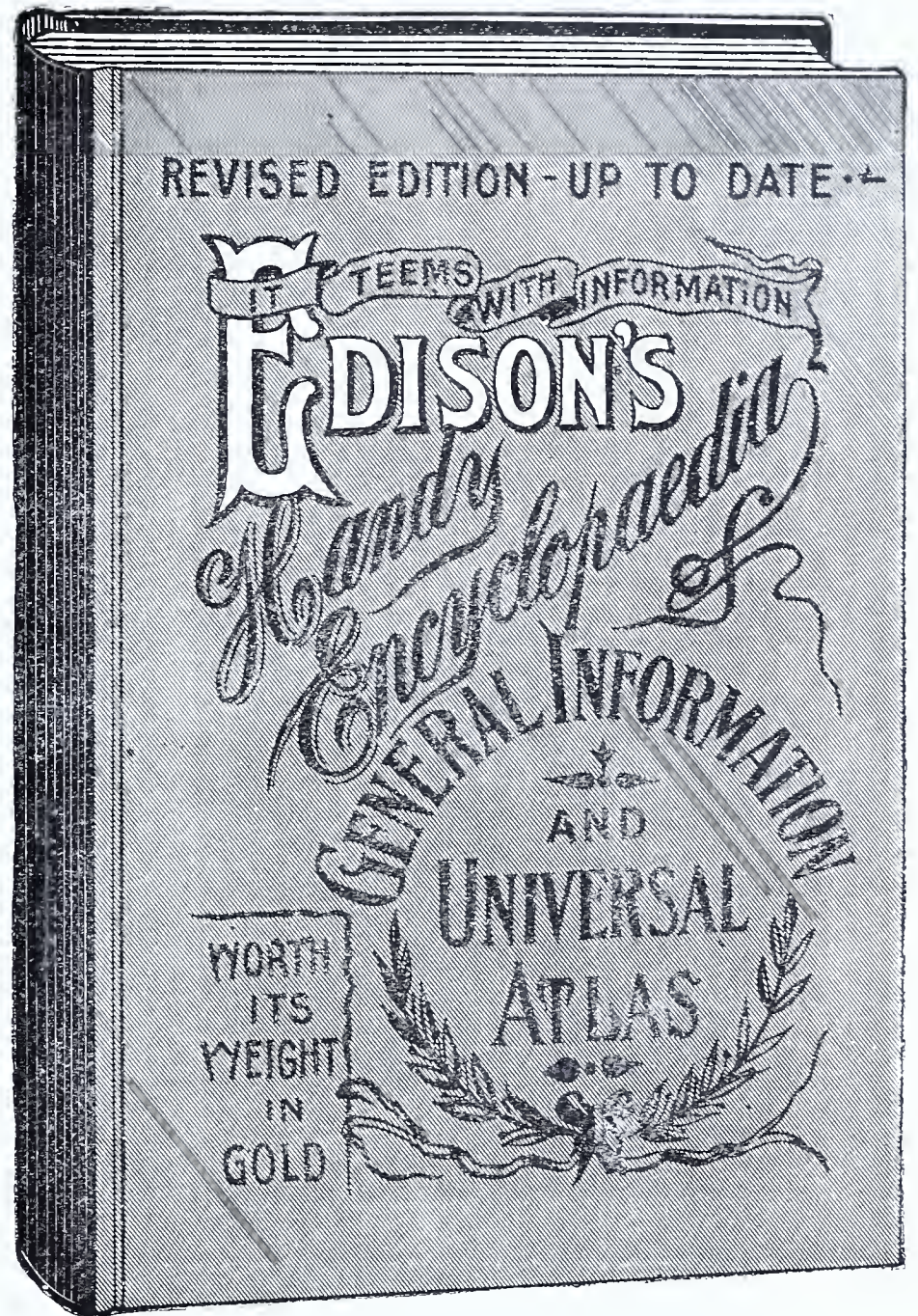
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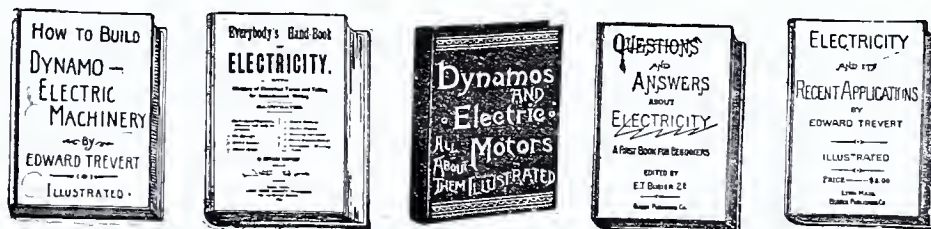
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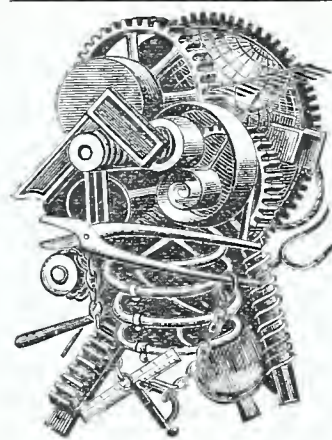
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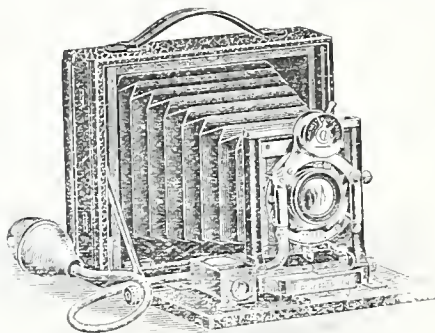
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### The Story of the Gun.

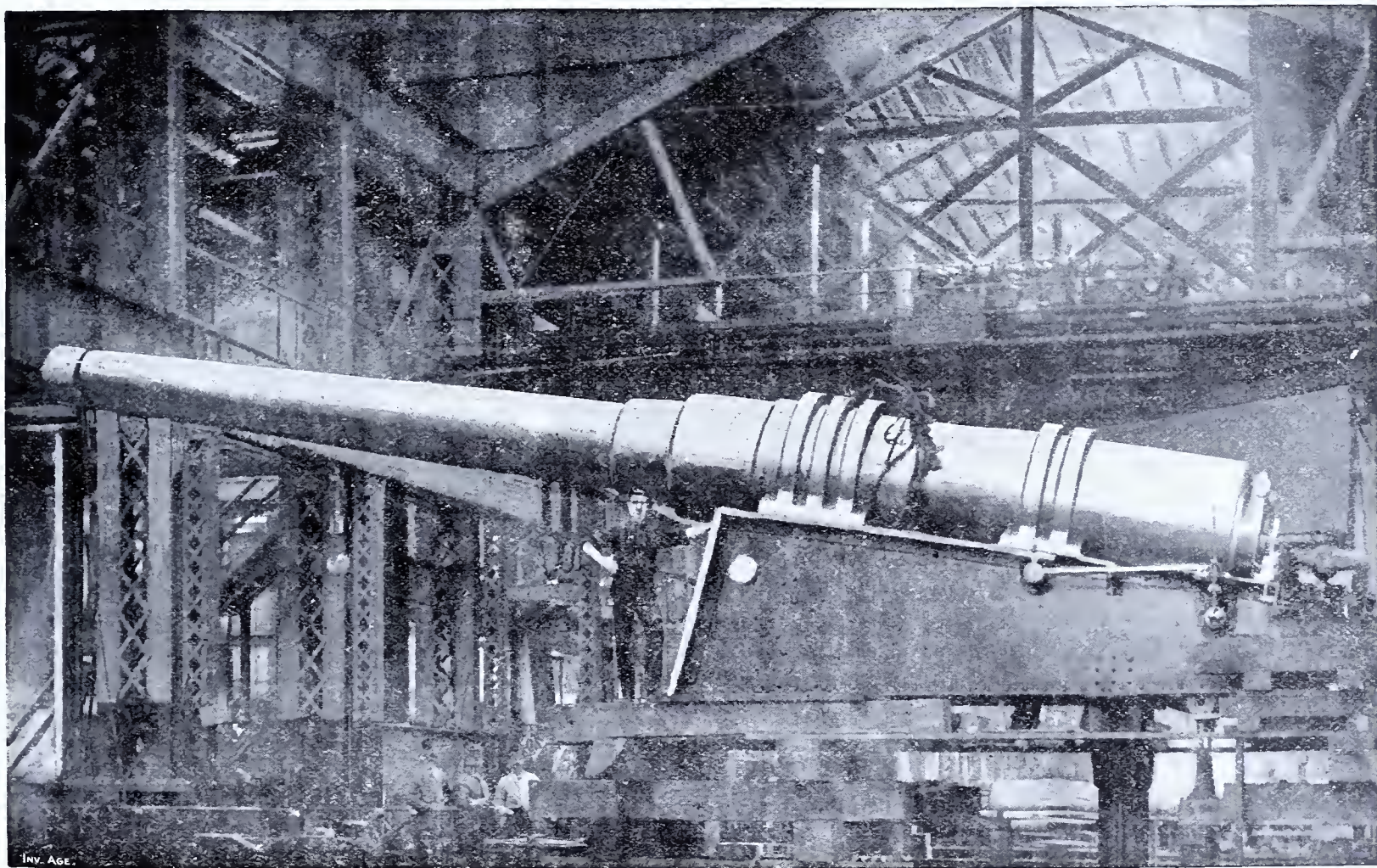
War, on this terrestrial ball began when Adam and his erring wife were driven from the delights of the Garden of Eden; for when our fore-parents left their "native hearth" they found it necessary to make war on the animals of the earth that food and clothing might be obtained. This is the probability. The weapons used in this "war"—the first of all wars, except that which occurred in Heaven (a pointer to the peace congress) when Satan was defeated—were no doubt sticks of wood. The latter assumed various shapes of effectiveness

swung between perpendicular beams—when the ancient castle was stormed and its walls made to tremble, from the "butts" of the ram.

The hand, string and spring power war-machines continued in use until and even long after the invention of gun powder and the cannon. The first of these was invented by the Chinese long before the Christian era; but notwithstanding this important discovery their inventive genius failed for many centuries to provide suitable weapons of war for its use. The ancient Chinese did however construct cannon, but these were made of wood, held

the Scotts, and at the battle of Crecy, and by the French at Puy Guillaume. In the fifteenth century cannon called bombards, culverins and serpentines were used, employing as shot both stone and iron balls, and at this period the process of making guns by casting, began. Bronze ordnance then also came into use, and its size (becoming smaller) and its shape took a change. In this century the breech-loader first came upon the gun stage, its invention being due to Spanish ingenuity.

With such field pieces—breech-loaders and others of bronze—Cortez made the conquest of Mexico and



THE LARGEST GUN MANUFACTURED BY THE UNITED STATES—38 FEET LONG, 13-INCH CALIBER.

as time progressed, and very early in man's history, were supplemented by the sling. As soon as iron came into use spears, lances, etc., were tipped with it; swords were made, and ere long numerous things of offense and defense were constructed of it, including coats of mail, in which the ancient warrior was clothed.

Propulsive weapons, beginning with the spear and sling were greatly improved by the catapulta onager, scorpion and balista. The latter was a stone-thrower, having a frame, to each side of which was attached a flat metal bowed spring connected by a cord of sinew, hair or other material. This weapon was effective at a thousand yards; and in aggressive warfare, its destructive work was much aided by the battering-ram—a beam

together by iron bands, and capable of but little damage. Cannon made of sections of bamboo were also used by the celestials, and it is a matter of authentic history, that in 1232, they employed gun-powder in their war with the Mongols.

In the fourteenth century fire-arms—including a sort of rude musket—were in extensive use in India, and by 1482, cannon were used there for naval warfare. In the seventeenth century the East Indians made a gun, which was 14 feet long, 28 inches in bore and carried a ball of 1600 pounds weight—nearly double the weight of those used in our 13-inch guns.

The cannon began its "usefulness" in Europe probably in the fourteenth century. It was then used with effect by Edward III, of England against

slew thousands of the followers of Montezuma; and with some of the same weapons, used by the *then* intrepid Spaniard, the Mexicans fought the Americans, in the war between their country and ours.

The breech-loader used by the old Spaniards was—as is seen in a specimen taken by the Americans in the war with Mexico, and now in possession of this government—a simple affair. The piece shown is 37½ inch bore. On the upper side near the breech is an apparatus 7 inches long by 4½ inches wide, into which the charge was put. The breech-block, or plug—resembling a flat-iron, with a handle extending above the gun—fitted into the aperture, extending into it about an inch, and was secured therein by a bar inserted through the side of the can-

(Continued on page 52.)



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WASHINGTON—NEW YORK, APRIL, 1898.

As an evidence of the "fighting spirit" in the house of representatives, we note the passage of a bill for naval purposes, which carries the respectable amount of \$39,000,000, and authorizes the building of three first-class battleships of about 12,000 tons displacement, also twelve torpedo boats and twelve torpedo boat destroyers. It will take at least three years to build the battleships; but when they and the smaller craft are completed our navy will have a round dozen first-class floating steel fortresses and between thirty and forty torpedo boats, large and small.

THERE will be general satisfaction among inventors and all who are interested in patent matters when the bill providing for an increase in the patent office force is passed. The bill is receiving much attention and encouragement from official sources, and its passage is more than probable. The work of the patent office is a long way from being "up to date," and the 200 examiners of the office, though doing their best, find it impossible to meet the demand upon their efforts. And this is better understood when we find that the increase of applications is 33 per cent more for 1897 as compared with 1886, while the increase in the examining force is only 6 per cent.

If there ever was an unjust measure drafted for congressional consideration it is H. R. 5,764, a bill giving to anyone the right to use and to sell any patent by simply obtaining permission to do so from the commissioner of patents, and by depositing with the commissioner not less than one per centum and not more than ten per centum of the gross receipts of pre-estimated cost of manufacture in which such patent is used. The inventor is required, before a patent is issued him, to file a sworn statement of the estimated cost of manufacture to which his invention applies, and as a "sop" he is promised (in the bill) a pittance of the money deposited by such as take his inventions as a free gift from the patent office.

In the death of Sir Henry Bessemer—the inventor of the process known by his name—who died in England on March 15, the world loses a man who gave to it much of material benefit, a man whose genius made possible a great deal in the dominion of steel and iron, those things that play so important a part in mechanical and industrial world. Sir Henry was born in Hertfordshire, England, in 1813, and was thus 86 years old at the time of his death. He was of French ancestry, his parents having migrated to England in 1789, and his title was conferred on him as a recognition of his valuable services in the field of invention. He was a public

benefactor, the record of whose worth is inscribed on the mighty wheel of human progress.

THE report of the Commissioner of Patents covering the operations of the patent office during the calendar year 1897 again shows a large surplus resulting from the business of that department. This is one of the branches of the government which yields annually an income largely in excess of its expenditures; and the accumulation of the profits of the patent office now amount to close upon \$5,000,000, which has been turned into the general treasury for expenditures in other directions. This moves American Trade to say: "And yet in spite of this excess of income over outgo it seems impossible to induce congress to permit the expenditures of these profits in improving the organization of the patent office and in providing better facilities for the transaction of its business. The work of the patent office is of immense importance to the manufacturers of the United States and their support should be given unhesitatingly to the measures designed to secure more liberal appropriations for the work of this department."

In the case of the Welsbach Light Company vs. the Sunlight Incandescent Lamp Company, Judge Townsend, of the United States Circuit Court, has issued an injunction against the latter company and calls for an accounting. This case was based on the Rawson patent, a method for treating the incandescing hood, in which paraffine was used. The defendant's case was that they were not using paraffine, but were employing in their work a solution made mainly of collodion and a small percentage of castor oil. The question of material used was ignored by Judge Townsend, who says:

The invention of the patent in suit transferred the Welsbach mantle from a laboratory experiment into an article of commerce; that it has successfully overcome the obstacles previously encountered, and has accomplished results quite as important as the original Welsbach invention, is admitted. \* \* \* For these reasons this patent should not be narrowly interpreted, but should be so construed as to cover a broad range of equivalents. \* \* While collodion is not chemically an equivalent of a hydrocarbon resin gum, and is not paraffine or shellac, it performs the same function in the same manner and with the same result."

## Responsibility for the Maine Disaster.

The general opinion that the battleship "Maine" was blown up from the outside and that it was a well-laid scheme of treachery, has been fully confirmed by the government official report. The condition of the destroyed ship, as seen in the drawings of the report, shows that no ordinary explosive was employed in its destruction, and the circumstances surrounding the case are such as to convince anyone—excepting Spain—that the most diabolical crime of the nineteenth century was perpetrated, in a scientific manner by "interested" parties, in Havana harbor on February 15th. It must have taken a mine of great size and power to have wrought the destruction shown in the wrecked battleship; and the exploding of such mine must have required a correct knowledge of its location, the various positions of the "Maine," and her exact position when the fatal button was touched.

The awful condition of Cuba may afford a just *casus belli* between this country and Spain; but the "Maine" incident is certainly something that comes "nearer home" to American citizens.

## Trade-Marks in Mexico.

The minister of Fomento has just presented to the congress of the republic a bill introducing certain changes in the law now in force concerning trade-marks. Hitherto, as per article 4 of the present law, foreigners could not register a mark in Mexico, unless they had an office or an agency there. In future—when the proposed changes have been passed—the owners of foreign trade-marks will no longer be compelled to appoint an agent or representative in Mexico in order to have their marks registered.

The inventor of the Nasmyth hammer left a fortune at his death of £243,800. He came to London in 1822 as a workman at ten shillings a week.

## The Right to Patent.

W. D. Wayman, general superintendent of the New German Plate Glass Company at Kensington, has served notice on the Pittsburg Plate Glass Company that if it persists in the use of certain inventions, claimed as his, he will take legal measures. Mr. Wayman, while connected with the Pittsburg company, mentioned, invented—as he claims—a rotary glass polisher, which effected quite a saving to the company, and which, four years ago, was patented by him. The Pittsburg Glass Company holds that as Mr. Wayman was in its employ when this polisher was made and adopted by it, he was simply an employee in the works, and that in constructing the polisher he was simply following orders. The company states also that one of its members directed the making of the improvement, and that most of the suggestions originated with another workman. It is also claimed that a patent for almost the same machine was taken out in this country and in Belgium in 1891.

This is a question which has often come up, and often left unsettled. When the brains and handiwork of a number of persons are employed in producing a machine, or other inventive product it is somewhat difficult to trace the right of proprietorship. But the mere fact of an inventor being in the employ of a company, to the appliances of which he makes valuable additions, does not take away his right to patent his product and to reap the benefit thereof—unless he has previously agreed to place his inventive genius at the disposal of his employers as part of his paid services.

## Death-Dealing Airship.

Prof. R. T. Leonard, an expert aeronaut of New Castle, Pa., has tendered his services to the government in case of war with Spain and has received a favorable reply from the chief of the signal office.

Prof. Leonard has invented a death-dealing airship. His airship, he says, will be suspended from a large balloon. It will be provided with gueroscopes, each of a lifting power of 500 pounds, driven by a compressed-air engine. After the balloon has once lifted the machine to the desired height it can be detached, if desired, and the machine can be floated for an indefinite length of time.

By tacking against air currents the airship can be guided in any direction and can be held in the upper regions for any length of time. Prof. Leonard proposes to carry 1,000 pounds of nitro-glycerine, inclosed in metal balls, each containing from fifty to seventy-five pounds. These balls will be inclosed in cotton to prevent their being exploded by friction as they fall. With a telescope to get the range, these balls will be dropped from a height of from two and a half to three miles. In order to assist in aiming correctly small solid metal balls will be carried to drop in testing. The fall can be followed by a telescope, and the professor will be enabled to drop the loaded spheres just where he wants them.

The aeronaut says that his airship will make powerless and worthless any vessel or fortification possessed by Spain. One ball will be sufficient to blow up the largest vessel afloat, and entire fortifications can be destroyed with a few loaded spheres. The bombarding of a city can be accomplished from the clouds more surely and quickly than by guns planted on terra firma or on the deck of a vessel.

Prof. Leonard is an aeronaut of twenty years' experience and has made 1,000 ascensions without once being injured. His airship is the result of long experience and many tests, and he says there is not the slightest doubt that it is entirely practicable.

## Clock Sympathy.

If we place two clocks on the same shelf and adjust their pendulums to swing in exact unison, and set one of them to running, in the course of time the other will start up in sympathy. Each sound impulse caused by the vibration of the pendulum of the clock that is running is communicated to the other pendulum. Each successive impulse adds to the swing of the sympathetic pendulum, which began in an exceedingly small way at the very first stroke of the other pendulum, and this goes on till the sympathetic pendulum is making its full swing.

While as a rule an iron bar lengthens when magnetized, when very powerfully magnetized it shortens again.

The average velocity of the Gulf Stream is three miles.



# THE GROWTH OF THE STEAM ENGINE.

By L. N. GILLIS.

## III. THE DOUBLE ACTING ENGINE OF WATT.

The waste of time and power, the impossibility of using steam at high pressures on account of the irregularity of motion thus produced and the demand for an engine adapted to be used with all sorts of machines as well as simply for pumping, lead Watt to consider the feasibility of applying steam to both sides of the piston in the cylinder entirely closed from the air. Meanwhile in 1779 one Wasbrough took out a patent for a steam engine which he designated to use to convert the reciprocating motion of the piston in the continuous rotary motion. This had been previously done in 1769 by Mr. Dugald Clarke and in 1777 by John Stewart. In neither of these cases, however, was there any

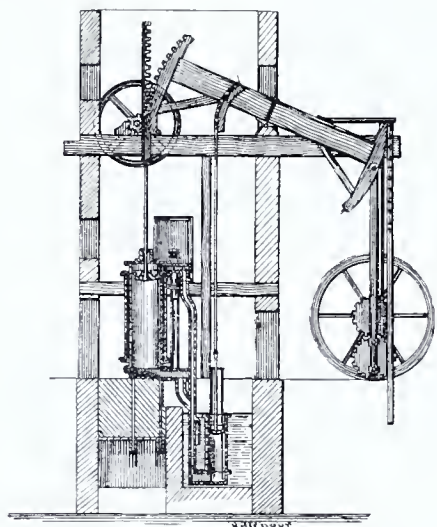


FIG. 9.

means of maintaining the circular motion and the result was great irregularity of movement. Wasbrough added the fly-wheel to produce regularity of motion and this is the first instance in which we hear of the fly-wheel being so used with the steam engine. These engines however lack the genius of Watt's in their design and were so mechanically imperfect as to be subject to frequent accidents and much irregularity of speed. Further circular motion was attempted to be attained by means of ratchet wheels.

Watt replaced the ratchet wheels by a simple crank using Wasbrough's fly-wheel to attain regularity of motion. He, however, neglected to apply for a patent, and as the patent laws of England then allowed others than the first inventor to

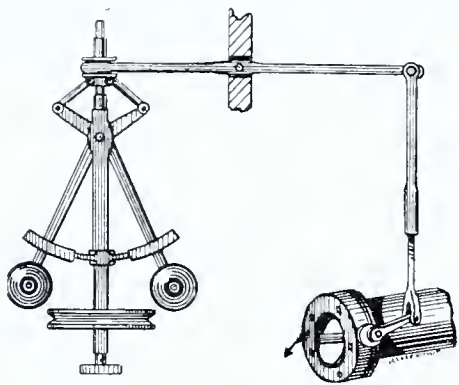


FIG. 10.

secure patents, he had the mortification to learn that a Mr. Pickard of Birmingham, had anticipated him in this essential step and thus he was deprived of the use of the crank. Nothing daunted however, Watt immediately turned his mind to other ways of accomplishing the same result and secured a patent for five different means for converting reciprocating linear motion in which contained rotary motion. After experimenting with these five means Watt and Boulton adapted the motion as is now known as sun and planet wheels.

Still the steam engine was a single acting one and it remained for Watt with a final burst of genius to transform the hitherto cumbersome and ineffective device to a double acting engine.

In 1782 Watt took out his first patent on an engine in which steam was attempted upon both sides of

the piston and a vacuum being at the same time produced at the opposite side (see Fig. 9). In this engine Watt used instead of the old chain a piston rod having upon its upper end a rack bar which, in connection with a segmental gear upon the walking beam, gave to that element an equal force both for pushing and pulling.

In 1784 Watt replaced this device with his parallel motion. This latter is shown in detail in Fig. 10.

To this Watt finally added the governor. The first of these engines to embody all the means of Watt's was erected at the Albion Mills in London in 1786, and included the double acting cylinder, the sun and planet wheel, the parallel motion and the governor as well as the old form of condenser and pump. Fig. 11, taken from an old print, shows one of these engines about as they were finally used.

With the introduction of the double acting engine comes the application of steam to mill work of all sorts, and with this application comes of course, the more rapid improvement of the machine so used.

Watt would not, however, allow his engine to be used with high pressure steam, although his partner repeatedly urged the same. Thus Watt's engine still had the defect of not using the steam economically since he did not use it expansively.

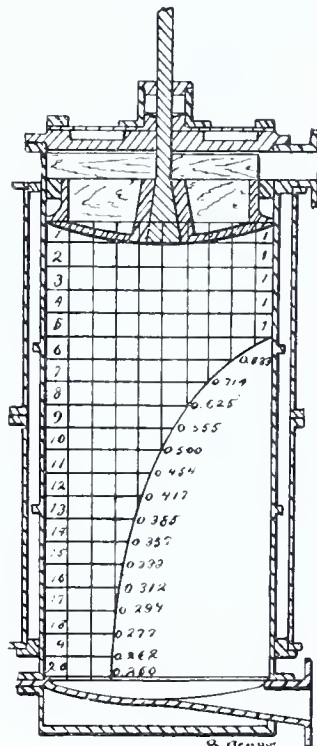


FIG. 11.

Watt's engine embodied, however, the perfection of a vacuum engine and was the goal to which so many inventors had aspired.

Watt, while not using high pressure steam, was so far alive to the possibility and value of its use that he included in his patent of 1769 a non-condensing form of engine saying, "in cases where cold water cannot be had in plenty the engine may be wrought by the force of steam only, by discharging the steam into the open air after it had done its office."

Watt also included the expansive principle of steam in his patent of 1782 and in that patent he shows a diagram showing the effect thereof, Watt's diagram is shown in Fig. 12.

Among the minor details that were improved by Watt were the valves of his engine which is illustrated at Fig. 13. These valves were made of brass and ground to a fit with emery. The opening

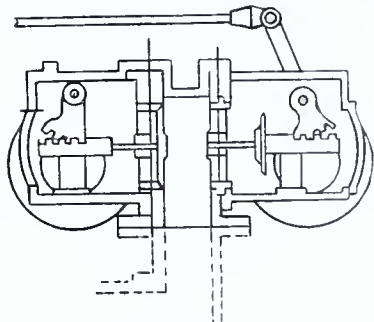


FIG. 12.

of the valves was effected by means of the usual valve levers and they were opened against the steam pressure so that when shut the steam only tended to retain them in place.

Watt also made improvements in the boilers

which supplied his engines with steam, and was so far in advance of Newcomen that he never attempted to place the cylinder immediately over the boiler.

During the time which Watt was perfecting his engine he made many curious experiments. It had occurred to him that he might gain advantage by making his cylinder of some non-conducting substance and he accordingly tried the effect of wood. He made a simple cylinder of six inches in diameter by twelve inches stroke of wood which he had soaked in linseed oil and baked to dryness. It was naturally found to be utterly inapplicable on account of its durability.

Watt also made many experiments on the latent heat of steam and of this Dr. Ure says: "In some

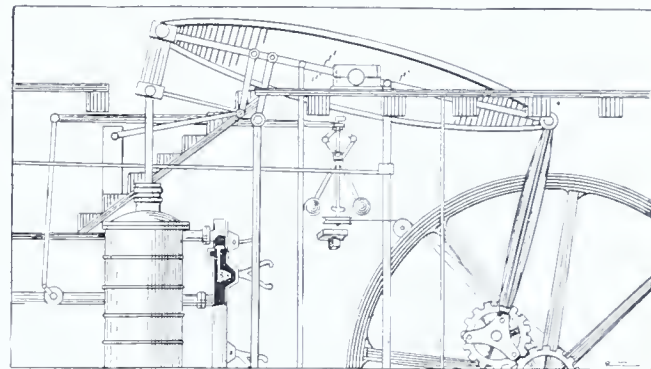


FIG. 13.

conversations with which this great ornament and benefactor of his country honored me a short time before his death, he described, with delightful naivete, the simple but decisive experiments by which he discovered the latent heat of steam. His means and leisure not then permitting an expensive and complete apparatus, he used apothecaries' phials: with these he ascertained the two main facts, first, that a cubic inch of water would form about a cubic foot of ordinary steam, or 1728 inches; and that the condensation of that quantity of steam would heat six cubic inches of water, from the atmospheric pressure to the boiling point. Hence he saw that six times the difference of temperature or fully 800 of the heat, had been employed in giving elasticity to steam, and which must be all subtracted before a complete vacuum could be obtained under the piston of a steam engine."

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Inventors who frequently ask concerning the best method of introducing their inventions, will be interested in the following:

Mr. B. F. Childress of Virginia, has invented a combination hat rack and advertising device which is especially adapted for use in large hotels and restaurants.

The prime object of this invention is to provide a receptacle in which a person can securely lock his own hat, and in so doing an advertisement of some kind or other is brought prominently before his notice.

Mr. Childress placed his invention in the hands of Messrs. O'Meara & Co., of Washington, for a patent and also requested them to furnish him a list of manufacturers in the line of his invention, to whom he could submit his invention, either for sale or manufacture on royalty. This list was furnished and among them were a number of manufacturers in Waterbury, Conn., inasmuch as his device involved a number of brass stampings.

Mr. Childress immediately went to Waterbury, after having placed his application of file, and while there negotiating with manufacturers in reference to making his article, he met Mr. W. Hurlburt of Waterbury, an extensive manufacturer, and who agreed to purchase his invention provided Mr. Childress would demonstrate its utility and profit. In less than one week Mr. Childress had secured more than \$700 worth of advertising for his rack in the City of Waterbury, thus proving conclusively the value of the invention as an advertising medium alone. This demonstration was sufficient for Mr. Hurlburt, who immediately purchased a three-fourths interest for \$5,000.

The point to be derived from this example is, that in order to interest capital in an invention, the inventor should take all the steps possible towards demonstrating the value of his invention, and that once this is demonstrated, his road to success is even and certain.

Sugar very considerably promotes digestion and muscular strength. One need only recall a book written in the early part of this century, in which it was agreed that life could be considerably prolonged by eating sugar in determined quantities: for those in excellent health it helps to digest those dishes in which the rich too frequently indulge; for those who suffer from stomach pains sugar when eaten after a meal will generally prove a valuable specific.



## THE STORY OF THE GUN.

(Continued from first page.)

non. Although breech-loading heavy ordnance was used centuries ago, there was a long interval of time before its general adoption, which began not long after the Franco-Prussian war, when Krupp, Armstrong and others began to make important improvements in this respect. Previous to this—notably in the American civil war—the old muzzle-loader (except in some cases of small rifled cannon, was the big gun relied on.

The history of rifled heavy ordnance antedates practical breech-loading by many years, and goes back to the fifteenth century. In 1661 the Prussians experimented with a gun, in which were 13 shallow grooves, and in 1696 the Germans tried elliptical bores. From thence on many experiments were tried, until 1833, when, at Brussels, considerable success in this respect was obtained. And so improvements in rifling went on, resulting in present day perfection, which is well illustrated in the heavy ordnance of the United States.

A cut of one of the new 13-inch guns being made by this government at the Washington gun factory is presented herewith.

In the meantime the structure of the gun was undergoing improved change; bronze and cast iron gave place to wrought iron welded in coils around a

forged at Bethlehem, Pa., one of the places from which Uncle Sam obtains his gun-forgings, that are put together at the Navy Yard. The core after having been roughed out, and made smooth on the outside, is ready to receive its jacket, a steel tube smaller than the core, which it completely envelops. The jacketing process ("shrinking") is as follows:

The core is stood up in the shrinking-pit, and the jacket, after having been heated red, is hoisted from the upright furnace by a powerful steam crane, which lets down from above its big chains and hooks, grasps with the latter, the glowing metal covering, now greatly expanded, and lowers it over the cold core. When the outer metal has cooled, the two tubes become as one piece, so intense is the contraction of the jacket, made more so by expansion of the core.

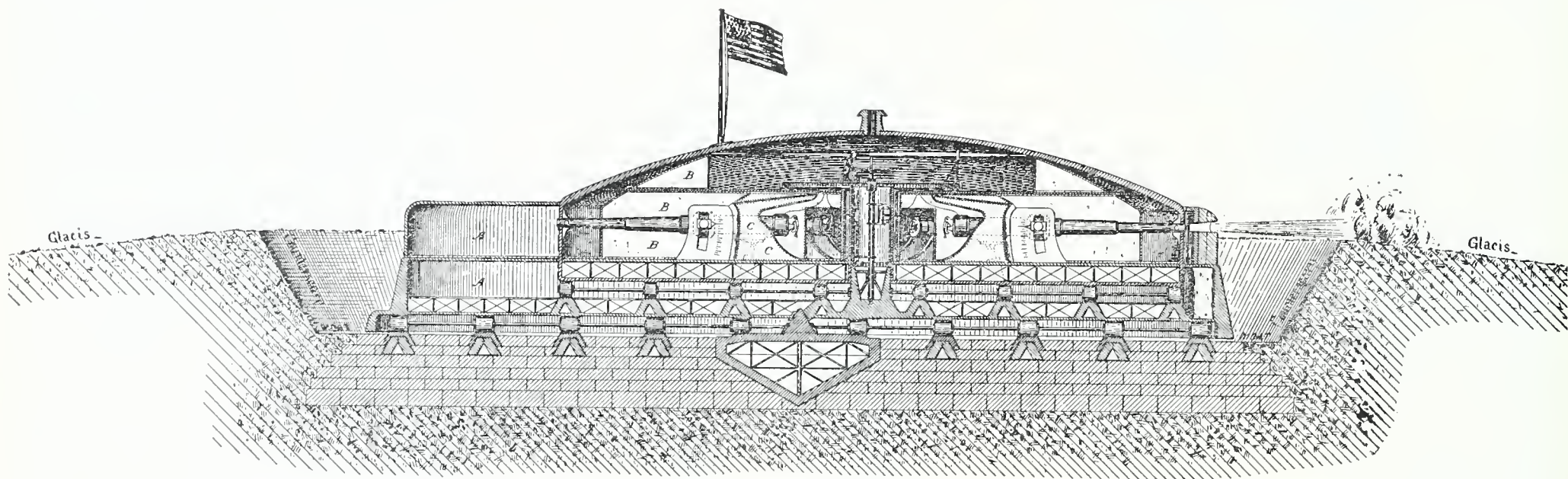
The "joint product" is now taken to the lathe, the exterior surface is turned smooth, and the encircling shorter jackets, or bands, which add so much to the cannon's strength, are shrunk on, as in the first shrinking process, making the breech of the gun the thickest part, that it may resist the enormous pressure when the gun is discharged. With all its hoops on, the now assembled cannon goes again to the lathe where it is properly trimmed and gotten ready for rifling. The product of the latter work is seen in spiral grooves half-an-

tank attachment, as well as to explain why his gun should not be weakened by boring it full of holes. A pneumatic-tube gun was patented in 1890; and in 1896, A. Krupp was given a patent for a wire-wound gun. In the latter, longitudinal wires were first laid, and upon these the circular wire was tightly wound.

The patent office will have at the Omaha Exposition an exhibit of large and small guns and pistols. This will consist of models not the least interesting of which will be one of an ancient Chinese cannon, consisting of two sections of hollowed wood held together by bands of iron. Many old muzzle-loaders patented previous to, and during the late war, will be in model evidence, and breech-loading heavy ordnance, patented in 1861, '64, '69, '72 and '74, will give something of a patented gun object-history. The first form of mutilated breech-block, patented in America (in 1861) will be shown.

A number of models of breech-loading and magazine small arms will also be in the exhibit, as will be models of early forms of revolvers. Among the latter one representing the foundation revolver patent of Samuel Colt, should be of interest. This bears patent date of 1836. With the magazine guns will be a representative of the Smith & Wesson patent of 1854.

While the "gun story" in the object-history display of the patent office may not be complete in



THE TRINBY REVOLVING TOWER FOR COAST DEFENSE.

mandrel, strengthened by rings around the breech; to rings of wrought iron forced on the barrel by hydraulic pressure, and to shrinking coils of wrought iron over an inner tube of mild steel. All these methods were good improvements in gun-making, but are not comparable to the hardened steel "dogs of war" which followed, and now pose as "peace-makers."

If one desires to see something of the evolution of the cannon, in interesting object-lesson, a visit to the Washington navy yard will afford a fine opportunity for the purpose. Here the old smooth-bore piece is very much in evidence, in a large number of big guns captured from the confederates in the Civil War—simply moulded cast iron, that could not now shoot through an armored cruiser—and some that played a part in this country's wars with foreign nations. Among the latter pieces are four of bronze, captured from the Tripolitans by Stephen Decatur. Others, spoils of war represent beligerent business at Yorktown, in 1781; Los Angeles, in 1847, and Japan, in 1864.

These specimens of obsolete heavy ordnance are in striking contrast to those now being turned out in the great gunshop nearby, where the roar of machinery—in the finest gun-plant in the world—reminds us of the thunder of war. There is also a vast difference in method of making a big modern gun, and that employed for the old-timer.

Building one of the former is something that takes many months of careful expert work. The gun begins its growth with the core or tube, which is

inch wide, into which the soft copper band surrounding the base of the projectile, cuts into, and gives the shot a rotary motion as it plows through the bore, and also serving to keep it point forward. The breech-plug—a circular screw, having longitudinal slots to enable it to be pushed into corresponding slots in the gun, where with a slight turn it is secured and ready for resisting backward force—finishes the modern cannon.

If the big-gun industry is not, and has not been for a long time, in a flourishing condition, it is not the fault of the inventor. He has done his "belligerent" duty—in his mind—as will be seen in the hundreds of drawings in the U. S. patent office which relate to killing machines for construction on a large scale.

Among these are a number of muzzle-loaders patented nearly fifty years ago. A patent for "strengthening" cannon—by putting a jacket around the breech extending it forward of the former, and supplementing it by a heavy band just behind the trunnions—was granted in 1863; and in 1865 another was issued from a piece having three superimposed sections, or jackets, almost exactly after the plan of our modern guns. Both of these were muzzle-loaders.

A "cow-skin" cannon—having a steel core wrapped with dampened rawhide—is one of the patented novelties, as is a water-cooled gun,—patented in 1862—in which were provided spiral passages for the circulation of water in all directions about the piece. For this the inventor failed to provide a

its various object connections, it will undoubtedly be most interesting.

## Revolving Turret For Coast Defense.

The accompanying cut, showing a coast defense tower and shield, was published in the INVENTIVE AGE two or three years ago, and as the value of such an invention can now be well appreciated it is reproduced as showing a small part of our government's defensive possibilities.

This revolving tower and shield, or turtle-back turret, is a turret revolving in an encompassing side shield which contains one port-hole. The large cannon mounted in the turret and automatically fired, deliver their charges as each in its circular course comes opposite the shield port. The engines used for the revolving apparatus are placed below the turret, and in operating a peripheral speed of about four miles an hour is obtained. With this time motion a shot can be delivered every four or five seconds.

With a steel turret and its outer shield of this kind, a most effective coast defender could be presented against an enemy's ships. Rising but little above ground it is necessarily difficult to hit, and when struck—unless from a dropping shot—the shot would glance off with little damage.

A number of these defensive towers placed at the entrance of a harbor, would render the inpassing of war ships almost, if not quite, impossible.

This proposed system is the invention of Mr. Theodore R. Trinby.



### The Cox Type-Setting Machine.

The type-setting machine has so long been a recognized factor in the publishing business that its further progress toward practical utility is marked only in minor improvements that will ere long make the machine a thing of perfection, as far as book and other line work is concerned. And some say a machine that will accurately set head lines, job-work, etc., will give another blow at hand-type-setting; plate matter will take a back-seat and the editor in the rural office will sit down to his type-setter and put directly into type the thought that draws public attention. All this may come in the future "electric age." Today the composing machine is a profitable, established factor, as evi-

line, the reaching of the end of which is told by the ringing of a bell.

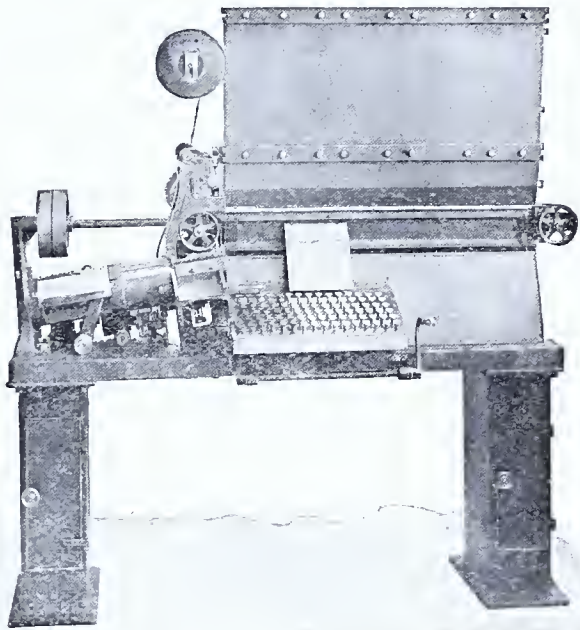
Automatic leading is employed in the machine, and an automatic throw-off device for guarding against breakage of type or injury to any part of the mechanism—are used throughout its make-up.

In justifying type the Cox machine is just the opposite of the Mergenthaler, which wedges the line outward. The former uses corrugated spaces, which, when the line is overset, are pressed from its ends until the required length is obtained. These spaces are made from a lead ribbon fed from a reel placed on the typesetter immediately over the space-making device, which operates when the space-box is depressed.

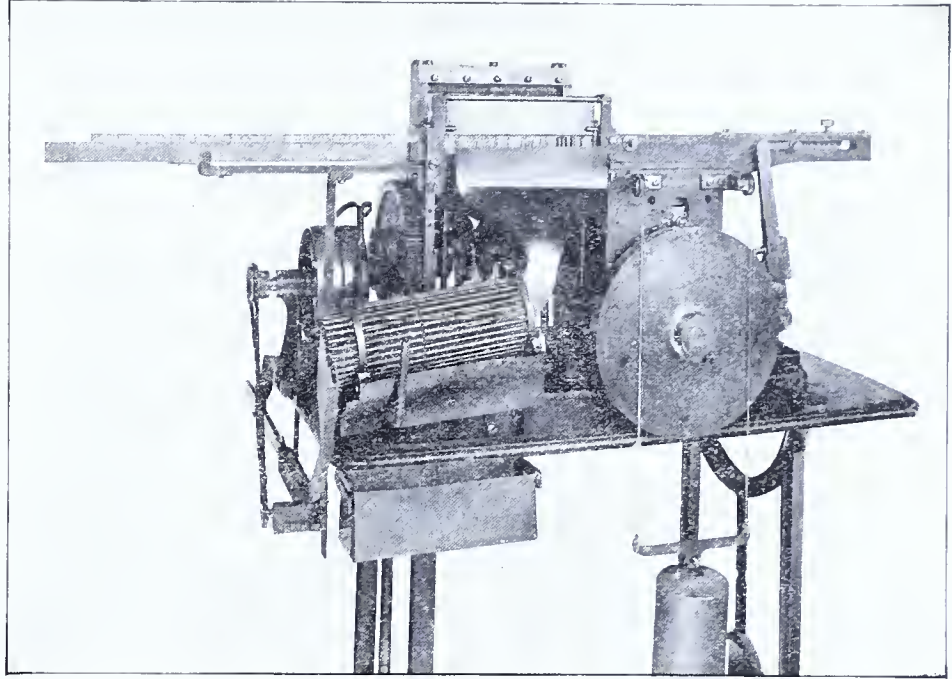
its work very rapidly, being capable of handling matter for two type-setters. Seventeen thousand ems an hour is possible with it. This great amount of work is made possible by the duplication of test words of letters most used in the font, such as e, o, t, h, n, etc., which are placed so as to catch all common syllables and short words in routine.

In operating the distributor, it is not necessary to use a high rate of speed to obtain a large product, as it can be loaded while being used.

It is claimed that the Cox type-setting machine is the most complete and satisfactory of its kind. It is rapid, accurate and easily managed and the work produced by it is of exceptional fine character. All this has been made possible by the



THE COX TYPE-SETTING MACHINE, FRONT VIEW.



THE COX SPACE DISCARDER AND LEAD EJECTOR.

denced in the fact that the Mergenthaler machine is a commercial success, paying a large per centage on invested capital—15 or 20 per cent on a capitalization of \$10,000,000 it is said.

Other type-setting machines are doing excellent work, notably the Cox Type-setter, the promoting company being Messrs. Barnhart Bros. & Spindler, type-founders, Chicago.

The idea that competition can be most satisfactorily done by the use of movable, founders-type, is

The space-discarder and lead-ejector are very important and interesting features of the Cox machine. In operating this the type is put in the galley of the machine and when the discarder is set in motion, a single line of type is separated from the dead matter; the leads are ejected into the lead-box. The line moving along (horizontally) until it is directly in front of the mechanism that ejects the spaces and quads from their positions in the set type. This is done by the space discarders, or feelers, which insert themselves over the tops of the spaces and quads, forcing them from the line.

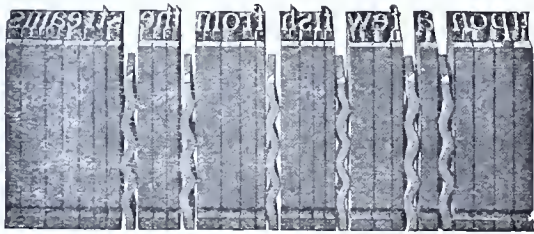
inventive genius of Mr. Paul F. Cox, and the Cox Type-Setting Machine Company, the latter having devoted several years to careful experiments with the machine, before they concluded to put it on the market as a perfected article, doing all that is claimed for it. The illustrations presented herewith show in detail the various mechanisms combined in the Cox machine.

### Cloth-testing Device.

The testing of the tensile strength of cotton, wool and various fiber, is something of much importance to the manufacturer, and a good apparatus of this nature will very probably find a lucrative field for its producer. A recently patented invention in this line consists principally of two tubular casings mounted on supports, which rest upon a common base, and extend lengthwise toward each other, having an open space between. One of the casings is provided with a rack-bar, which projects through its inner end, and which is provided with a cam-operated clamp at its inner end and a spring at its outer or back end. The spring is also attached to a screw at the outer end of the casing, and by its yielding resistance regulates the movement of the rack-bar. The other casing contains a spiral screw rod operated by a wheel attached to its outer end, and working in a sliding tube at the end of which is a device for securing one end of the material to be tested; the other end of this is secured in a similar device on the inner end of the rack-bar. When the material is ready for testing, the wheel is turned until the limit of the material's resistance is reached and the strength record made. The latter is done by a pointer which projects from the rack-bar through a slot in its casing and moves in front of a scale of figures as the spring stretches, and marks the highest tension at the breaking point of the tested material.

The cloth-testing device is the inventive product of Samuel McKnight of New York.

According to the "Pittsburg Dispatch," at the Girls' Industrial School of Kansas, situated at Beloit, they have what is called a spanking chair. It consists of a seatless chair on which the girls are placed. It is high enough from the ground to allow four paddles to be operated by an electric motor. Bad girls are strapped in the chair, an attendant presses the button and the chair does the rest.—*Electrical World*.



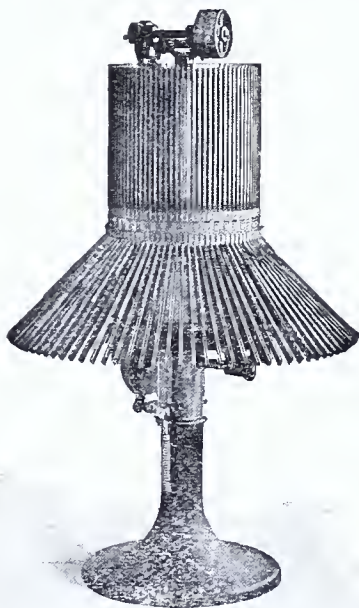
LINE OF TYPE BEFORE JUSTIFICATION.

fully demonstrated in this machine, which is the result of long and patient labor by its inventor. It is simple in detail, but accurate, combining in its



LINE OF TYPE AFTER JUSTIFICATION.

fine mechanism a high order of utility in both setting, justifying, and distributing type. Its keyboard has sensitive action, is conveniently arranged, and can be locked, by pressing a button, against accident. The copy is placed directly before the operator, and when a line is out of fix it is easily seen and corrected before justifying, the latter work being done by mere pressure of a lever. A line from 13 to 26 ems in length can be set quickly without readjusting any of the cams or gears, an indicator being used to determine the length of the



THE COX DISTRIBUTING MACHINE.

The latter then passes out of the machine into individual channels ready for the distributor; the quads are separated from the spaces and automatically stacked in channels ready for use in the type-setter. The discarder does about one-fifth of the distributing work, and can easily handle dead matter for three distributors. Its capacity is over 30,000 per hour. The distributor is simple and does



### The First American Patent.

As there is going on in the scientific world a discussion as to the first patent granted by this government and its date of issue, the INVENTIVE AGE sets forth the facts in this number, and also presents herewith a cut of the letter-text of the oldest patent now in existence.

As will be seen by the date of the latter, it was issued—at Philadelphia—on the 23d of December, 1796; but nearly 6 years prior to this (in 1790) a patent was given to Samuel Hopkins for a new method of making pot and pearl ashes. We are not aware that this process, or formula, had anything to do with machinery. But in Passmore's machine "the conjurer for cooking and boiling water" (note the absence of the comma after "cooking")

while the lime is still hot. This mixture is rubbed up with from 25 to 50 per cent of its own weight of white cheese before it is applied to the canvas. The prepared canvas is finally smoothed, and is said to be far less liable to crack than one treated in the ordinary way.

### The New Cruisers Purchased by the United States.

The protected cruisers Amazonas and Admiral Abrouall, purchased by the United States from Brazil, are about of the class of the cruisers Cincinnati and Raleigh. They were built by the Armstrongs and launched at Elswick. They are sister ships of the Barroso. The vessels have a displacement of 3,600 tons, they are 300 feet long, with a breadth of beam of 43 feet 9 inches and a draught of 16 feet 10 inches. Their engines have an indicated horse power of 7,500, furnishing a speed of twenty

## The United States of America.

To all to whom these Letters Patent shall come :

WHEREAS *Thomas Passmore* a citizen of the State of *Pennsylvania*, in the United States, hath alleged that he has invented a new and useful improvement  
to wit: *a machine called the conjurer for cooking and boiling water*

which improvement has not been known or used before his application; has made oath that he does verily believe that he is the true inventor or discoverer of the said improvement; has paid into the Treasury of the United States, the sum of thirty dollars, delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose: THESE ARE THEREFORE to grant, according to law, to the said *Thomas Passmore* his heirs, administrators, or assigns, for the term of fourteen years, from the *fourteenth* day of *the present month of December* the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said *Thomas Passmore* himself, in the schedule hereto annexed, and is made a part of these presents



IN TESTIMONY WHEREOF, I have caused these Letters to be made Patent, and the Seal of the United States to be hereunto affixed.

GIVEN under my hand, at the City of Philadelphia this *twenty third* day of *December* in the Year of our Lord, one thousand seven hundred and ninety-*six* and of the Independence of the United States of America, the *Twenty-first*

*G. Washington*

By the President,  
*Timothy Pickens*,  
Secretary of State.

City of Philadelphia : TO WIT :

I DO HEREBY CERTIFY, That the foregoing Letters Patent, were delivered to me on the *twenty third* day of *December* in the year of our Lord one thousand seven hundred and ninety-*six* to be examined; that I have examined the same, and find them conformable to law. And I do hereby return the same to the Secretary of State, within fifteen days from the date aforesaid, to wit: On this *twenty third* day of *December* in the year aforesaid. *Charles Lee*  
Attorney General.

### FAC SIMILIE OF FIRST PATENT ISSUED IN THE UNITED STATES.

we find the beginning of the patented mechanical idea, from which the wheel of American inventive mechanism has rolled so triumphantly down the road of human achievement.

There have been several claims to right of priority as to the first patent issued in the United States—notably to Samuel Bartlet in 1808, for an improvement in rolling tub mills; and one issued to Miss Mary Kies, of South Killingly, Conn., for "weaving straw with thread." But the potash-pearl ash invention is the father of the patent brood, and is, as we have stated, followed by the "machine for cooking and boiling water." The patent for the latter can be seen in the National Museum.

A new method of preparing canvas for painting has been invented by G. L. Schudt. The canvas is first soaked in milk, and then coated with a mixture of lime, slaked with a minimum of water, beeswax, and linseed oil, the two latter added

knots. With full coal bunkers (800 tons) the cruisers can steam 8,000 knots at a speed of about ten knots. Both cruisers have twin screws. They have steel protective decks, extending from stem to stern, with an extreme thickness of three inches. The coal bunkers, rising to the height of six feet above the water line, give additional protection. The armament consists of six 6-inch 50-calibre Elswick rapid-fire guns, firing three ahead and three aft; four 4.7-inch 50-calibre rapid-fire guns, ten 6-pounders, four 1-pound Nordenfeldts, four Maxims, two field guns, and three torpedo tubes. —Seaboard.

In the March number of "Facts and Fiction" is a letter from Hon. Hazen S. Pingree, governor of Michigan, in which he states the principles that he considers as governing in attaining success in life. This is a vital subject, and as Gov. Pingree is competent to give good advice, this letter should be widely read. In the same number is an exclusive article from Dr. T. Dewitt Talmage, entitled "Glimpses from Hawaii," fully illustrated. This article is timely and valuable.

### Inventions and Their Birth.

The first really practical sewing machine was invented by Elias Howe, of Cambridge, Mass., in 1841.

The electric light was first obtained by Sir Humphrey Davy in 1843, but recent improvements by Edison and Brush have made its general use possible.

The telegraph was invented by Samuel F. B. Morse, of Charlestown, Mass., in 1837, five years after he began experimenting. He obtained his first patent in 1840, and in 1843 congress appropriated \$30,000 for its development.

The steam engine was invented by James Watt an instrument maker at the University of Glasgow, in 1763. In 1769 he patented his famous condenser, and in 1874 his parallel motion, throttle valve governor and indicator, all of which are still used.

Railroads, with wooden rails, were first used in 1672 at collieries; cast iron rails were first used in 1738. An iron rail nailed to wooden sleepers was first used in 1776, and the present idea of rails and wheels adapted to each other was invented in 1789.

The first locomotive was built by Richard Trevithick in 1804, but the first locomotive after the modern idea was built by George Stephenson in 1829. The idea of the construction of a locomotive was given to the world by James Watt in 1769 and patented by him in 1874.

The steamboat, now indispensable to the navigation of rivers and lakes, and for ocean travel, was invented by Robert Fulton, an American, who conceived the idea in 1793. He built the first vessel, the Clermont, in 1807, the first successful voyage being up the Hudson from New York to Albany.

The telephone, an invention for reproducing the human voice by the agency of electricity at long distances from the speaker, is due to the ingenuity of Elisha Gray of Chicago, Professor A. Graham Bell, of Washington, Professor A. C. Dolbeare, of Tufts College, Massachusetts, and Thomas A. Edison, of Menlo Park, N. J.

The air brake was invented by Westinghouse, 1874; the torpedo, by Bushnell, 1777; watch, by Peter Hele, 1477; thermometer, by Drebbel, 1609; telescope, by Lippersheim, 1608; printing, by Gansfleisch, 1438; cotton gin, by Eli Whitney, 1793; microscope, by Jansen, 1590; lithography, by Senefelder, 1798, lightning rods, by Franklin, 1752; gun-powder by Schwarz, 1320; balloon, by Montgolfier, 1783; barometer, by Torricelli, 1643. —Journal of Education.

### Holland Submarine Boat.

One of the many possibilities of electricity is shown in the Holland submarine boat—which is the best of its kind yet invented—made a success by the electric current. This peculiar craft is the sixth under-water boat built by Mr. Holland, who began his work in this line twenty-one years ago. His latest production is a cigar-shaped vessel 53 feet long by 10 feet 3 inches wide (beam). She has a steel frame overlaid with plates of this metal about one-half inch in thickness. Her deck is surmounted by a conning-tower two feet in diameter, through which access is had to the hold. From the conning-tower the pilot takes his observations, while the vessel is above water, or partly submerged; but when she goes down below surface, the tower is hermetically closed. The Holland boat is run by two separate sources of power, gasoline and electricity. The latter generated by a storage battery, is used when the vessel is employed under water, at which time a speed of about 9 knots per hour can be attained. Surface work brings the gasoline engine into play, by which 16 knots can be made. In making the change from one motive however to the other, it is only necessary to disconnect the engine in use from the propeller-shaft and harness the idle machinery thereto.

The boat is lighted throughout by electricity and also provided with electric bells for signaling purposes.

When it is desired to submerge the boat, water is admitted to a number of tanks, or she can be made to dive by manipulating the horizontal rudder, by which she can also be kept at any distance beneath the surface. To rise above water it is only necessary to force air into the tanks, expelling the water and thus giving the required buoyancy. The tanks also supply fresh air sufficient for nine or ten hours use by the crew. If by any chance the air supply fails, a float, carrying with it the end of a rubber-tube, will be sent to the surface and a sufficient quantity of breathing material pumped down into the boat.

Many successful tests have been made with the Holland boat, and the only trouble experienced so far is with the machinery, which owing to its complexity is inclined to get out of order. This, of course can be remedied.



### For Inventor's Eyes.

BY ROBERT GRIMSHAW.

It would seem ridiculous for a man to go about in winter selling linen dusters, or in summer selling fur overcoats. One would say "Why don't he offer something that some one wants?" A noted merchant once put it in this was concerning the ability of a certain man: "It requires no brains to sell a man an overcoat in December, if he has none, and has the money to buy it; but it requires genius to sell a thick overcoat in July."

Yet the inventor of the period is going about doing just that very thing of offering people what they do not want, and all the while disregarding their cries for things that they not only want but need and can pay for.

Below there are indicated some things for which there is a demand, already expressed; and others for which those who have good judgment and experience in the matter say there would be a good sale if they were produced.

The first is a better way of making joints in lead pipes such as are used in ordinary house-plumbing. The soldered joint as usually produced is very expensive and unsightly. Some mechanical means, taking advantage of the fact that lead will weld cold and that a water-tight joint can be made by pressure alone if properly applied, should be satisfactory. It would be difficult to produce a method which would be as crude and behind the age as the present way.

Street sweeping as at present conducted is done very badly. When it is done at all, there is a diagonal rotating brush which throws some of the dirt in a windrow along side the track of the machine, and some of it in the eyes of all those on one side of the street. If some one will produce a machine which will clean the street thoroughly and well in regular strips as wide as the distance between the wheels of an ordinary wagon, and which shall deposit the dirt in a box or tank on the apparatus itself—he will deserve the thanks and the dollars of the community.

The return postal-card idea is a good one, but as it is put into shape now, has a good many faults. One is that the person first using it is apt to fall into the mistake of writing the address on one half and the text or communication on the other, thereby spoiling both parts. The other is that unless he is very careful in folding it, the reply-half gets post-marked at the first point of mailing, thereby rendering it useless. The third is that the message can be read by any one *en route*, when it might just as well be covered. A cheap and rapid way of closing and holding closed these double cards, need not require much pushing in Washington and other capitals, unless the royalty asked was too high.

One article of large consumption, the demand for which seems to be increasing year by year, and thanks to our American ideas of progress will probably increase in an increasing ratio for decades to come, is the school slate. Yet it is, after all, as now made and used, a filthy, noisy and insufficient affair. Its chief advantage seems to be the erasability of the writing when effected by a slate pencil. Of these last there are two kinds; those made from slate, and those made from soapstone; both of them are brittle; the first very noisy and the second making greasy marks. The slates themselves are veep easily broken. Substitutes for them have been produced, made of sheet-iron coated with a composition; but these soon wear out, and the marks made on them with an ordinary slate pencil are trying to the eyes. A betterment is needed in this line.

The nose-glass (or eye-glass as it is most often called) is usually a very annoying article; filing ridges on the side of the nose if one has a good nose; falling off entirely at the slightest provocation if one has not been blessed with a first-class nasal prominence; getting tangled in one's hair and beard and clothes and eye-glass guard, and breaking most easily—especially if one happens to be traveling, or in some place where repairs cannot be readily made. Horn, tortoise-shell, hard-rubber, and cork, are used as facing-pieces to keep them on the nose; but there are too many rivets and too many pieces, and the whole affair is too slender and impractical. There is room for the inventor to take up the matter and invent an eye-glass frame that shall be new "from A to izzard."

If one will inspect the reports of the Commissioners of Railroads each year one will see that the number of deaths and serious injury resulting from brakemen falling off freight-car roofs is a large and appalling one, and gives no signs of diminishing, at least in winter, especially in the northern states, where the car-roofs are apt to be covered with ice and sleet. The inventor of a guard which shall be cheaply and readily applied to existing freight-cars, should have a claim to the gratitude of the public and should also make money out of the invention.

Anti-friction bushes for hoisting-pulleys, espe-

cially such as are used in ship's tackle, and of these more especially those which like the lower block of the "cat and fish tackle" are exposed to the action of salt water, are in demand; as their use would tend to diminish the power required to raise a given anchor or sail or to effect any other given work; as well as bringing less strain on the ropes and thus not only lengthening their life but diminishing the chance of accident. It must be remembered that the opportunity for lubrication of such tackle is often entirely lacking; they must trust to anti-friction rollers or balls and to good design, material and workmanship for continuance of their superior qualities.

Some one has been demanding a machine for pressing scrap tin into pigs or cubes. As it is such material is about as difficult as bran to make into a package which can be cheaply handled as freight or otherwise. Usually there are no two pieces of the same size or shape, and they become so interlaced among each other that it should be more a question of brute force than of any thing else to get them compressed into a mass that may be carried in a wagon, car or boat, handled by laborers, and charged into a metal-furnace.

The postage-stamp canceller of the nineteenth century is not up to the standard of other inventions. There appears to be but one patent that is doing its work at all well; and this seems to be too costly and complicated for general adoption. As it is, the transmission of our mails is largely retarded by the necessity of cancelling each stamp by hand. To do this and at the same time get a legible post-mark is not so easy as one might imagine, when great speed is imperatively demanded. Yet the production of the post-mark is of more importance than one would at first blush demand. Post-marks are often put in evidence in law-suits—as for instance to show that the premium of a life-insurance policy was mailed before the date at which without sending the policy would expire; or where a person is given an option on certain merchandise at a certain price, until noon of a stipulated date, and so on.

The laws concerning the application of fire-escapes on all buildings having more than one family, such as boarding-houses, boarding-schools, hotels, factories, etc., is felt by many in large cities to be oppressive, as the only known fire-escapes that are at all effective are, up to the present writing, permanent affairs which are miracles of unsightliness. A design patent at least could be obtained on something which would be at once efficient and ornamental; and doubtless if our readers set their heads to work, they could produce something which would embody a new principle of construction, and thus properly become a subject for a patent proper.

Anti-magnetizing watch-movements have not yet been produced to suit the pocket (in both senses) of the average consumer. As it is, with the introduction of electrical currents of high voltage in every other street and building, there is always danger lest one's watch gets magnetized; and such a state of affairs might be a costly one—as for instance, if one missed a train or a steamer.

The trolley cars entail on the motor-man an amount of vigilance and labor which, would really call for two brains, two pair of eyes, and two pairs of hands and feet. If we could get him a relief from one or two of the present necessary operations—as for instance, ringing the alarm-bell by electricity, at the same time as the car was started in operation or at any time that he pleased, and for as long or as short a time as he pleased, we would be doing him a favor, and by reducing the chance of accident, have a claim on the attention of the management of the roads.

### A Novel Advertising Candle.

Among the odd trade advertisements displayed at the recent Stockholm exhibition, the Lilietolmens candle played a prominent part. This candle stood no less than 127 feet high. The lower part, which was intended to represent an old Swedish candlestick, was in reality an enormous structure of bricks and mortar, in which was established a perfectly equipped candle factory, where employes worked six hours a day. The base of the candlestick covered a space 40 feet square. To come to details, the candlestick itself was 47 feet high, while the candle—a real stearine specimen—was fully 80 feet; its diameter was 8½ feet. The appearance of this extraordinary trade trophy was at once remarkable and imposing. The colossal candlestick was painted with an aluminum powder until it shone like well polished silver. At night, too, an electric searchlight of 7,000 (ordinary) candle-power cast its beams from the lofty summit of the wick over the whole of the exhibition grounds. Altogether, the cost of the monster was about \$10,000.

Clothing made of paper is not so very new, after all, for Pompeian excavations have revealed shoes made of paper. These shoes are light and waterproof, and might well be adopted today.

### To Liquefying Atmosphere.

From recent events in the scientific world it is evident that there is something of new interest "in the air." This concerns the statement that Mr. C. E. Tripler, of New York, has cornered the wind and forced it into liquid. This of course is not a new idea, but its importance lies in the fact that liquid air is now being made in considerable quantities at comparative small cost. In doing this an ordinary compressor, having three pumps upon one piston shaft working in line, is used. The first of these pumps gives a pressure of 60 pounds, which is raised to 750 pounds by the second and to 2,000 pounds, to the square inch by the third.

About 40-horse power is employed in compressing the air, which after each compression flows through jacketed pipes and is cooled by water. Upon being compressed the third time, the air flows through a cleaning apparatus, and is then passed on to the liquefier, which is Mr. Tripler's special invention. A portion of the compressed air is made to expand into a tube surrounding the main air tube, by means of a valve, the mechanism of which is kept secret. The outer confined air by this method absorbs the heat from that in the inner tube, the temperature of which is brought below liquefaction and its pressure much reduced, so that when the valve is open at the bottom of the apparatus, the liquified air flows out much after the manner of water. It can now be put into cans, and if covered with felt, or other good packing, kept for several hours. Of course it evaporates comparatively rapidly, and its retention depends upon quantity.

Liquid air can be used for a great many purposes—for cold storage, ice cream making, as a germicide, etc., etc. With suitable machinery it may be possible to use it for heat, light and power, on account of its exhaustive force-making qualities.

A drop of this magic liquid will instantly convert water into ice, and by its help a man can eat his gin-fizz, or leisurely chew up his champagne cocktail. But we hesitate to describe the condition of the man who by mistake swallows a cupful of liquid air.

It is claimed that the power contained in this natural force-maker can be obtained at a cost of 20 per cent less than that of producing steam. If this be true "harnessed" air should do considerable towards solving the power problem.

At the March meeting of the Franklin Institute, Philadelphia, Mr. Chas. E. Tripler of New York, made an interesting demonstration of some of the properties of liquid air.

The effect of the fluid on various substances is curious. Rubber, eggs, onions, oranges, beefsteak, iron and tin plate were rendered very brittle by being immersed in it, and the speaker performed many very curious experiments with these substances. Mercury is rendered very hard, having a tensile strength while under the influence of the liquid air about equal to that of cast iron under ordinary conditions. A hammer made of mercury treated with the liquid was used to drive nails through a board, and a bar of mercury treated in a similar manner held in suspension a 56 pound weight for a period of twenty minutes before the threads about the screw eyes in either end of the bar melted sufficiently for the screw eyes to pull out. Gold, silver, and other of the higher metals were unaffected by the material, and leather and some other substances showed no radical change.

Cotton waste, Mr. Tripler explained, when soaked with the liquid and fired with a match, develops an explosive power greater than gun cotton, and small pieces of copper pipe and steel bicycle tubing were shown in which cotton so treated had been placed without packing. Both were split and torn as if they had been simply paste-board.

It is reported that a Paris physician has made a discovery that will be of undoubted value to electrical men who are so unfortunate as to be burned by the electric current. The Paris doctor says that a solution of one part picric acid and seventy-five parts of water will cure quickly the most serious burns. The pain is instantly removed without blistering or irritation, and the wound heals in four or five days. A yellow tint is left on the skin, which may be removed by a solution of boric acid.

A small piece of cheese and an electric wire form the latest rat-trap. The cheese is fixed to the wire.



### To Increase the Patent Office Force.

Notwithstanding the great interest in and the steady stream of appropriations now being made for military and naval purposes, it is to be earnestly hoped that a bill pending in both the senate and House of Representatives for the allotment of a very modest additional sum for the needs of the patent office will not be lost sight of. In no other department of the government is it expected that the service shall be crippled or the expenses of properly conducting the business be limited by the additions we are now making to the army and navy for coast defense and possible foreign contingencies, and it would seem ridiculous, if the subject were not really so serious to all inventors, to bring up any such idea of false economy in opposition to the proposed measure.

The bill presented in both branches of congress by Mr. Platt, of the senate committee on patents, S. 4168, and Mr. Hicks, of the corresponding house committee, H. R. 7082, provides for the employment of an additional patent office force involving an expenditure of \$62,880 a year, which, it is pointed out, is only a small proportion of the excess of fees over expenditures, in accounting for the moneys annually paid into the government by inventors, manufacturers and owners of patents. To illustrate the particularity with which the bill has been drawn and the caution exercised that there shall be no room for extravagance on the part of the patent office, it is especially stated that the whole number of additional employes shall not exceed four principal examiners, four first assistant examiners, four second assistant examiners, eight third assistant examiners, eight fourth assistant examiners, four first-class clerks, four copyists, six laborers, six assistant messengers and six messenger boys. It will be admitted, we think, that the business of the patent office, has been looked into with great attention to detail when so modest an appropriation therefor is so specifically guarded. But we hope that, with such inspection of the business, it did not fail to impress itself upon the members of the committees on patents of both branches of congress that the present quarters occupied by the entire force for the prosecution of their work and the keeping of the necessary records are altogether too cramped and overcrowded for the attainment of the best degree of efficiency. More room and better facilities, especially a well equipped laboratory, are quite as urgently called for as the additional force of examiners, clerks, etc.

The especial reason for bringing forward this bill at present is found, not in the well-known fact that the patent office has been overworked for years, and the issue of patents thereby greatly delayed, but in the need which has arisen, as a consequence of the act of March 3, 1897, for a more perfect revision and classification, by subjects matter, of all letters patent and printed publications which "constitute the field of search in the examination as to the novelty of invention for which applications for patents are or may be filed." It is now made especially the duty of the patent office to see that an invention for which application for a patent is made shall not be patented or described in any printed publication in any country before the invention made by the applicant, and, according to the report of Mr. Hicks, it is the intention by this appropriation to enable the commissioner of patents "to make examinations in a manner so thorough and complete as to insure the issuance of patents only for such inventions as are unquestionably new; so that the patent when issued shall be an affirmative statement, certified to under the seal of the patent office, that the invention covered thereby is new, and has not been described in any patent or printed publication." It will be seen, therefore, that the design is to enable the patent office to make competent examinations of the whole field of invention—embracing more than a million issued patents and a vast accumulation of technical publications—the effort to do which is already constituting a great drag on the work of the office, which is now from two to seven months in arrears, and it being evident that "the office is struggling with a load much too heavy for it to carry." The commissioner expects that, with the additional appropriation, "the income of the office will be greatly increased by the more rapid and thorough disposal of the business and the increased number of applications which will be filed when it is assured that action upon them will be prompt and thorough."—*Scientific American*.

### A New Use for the Phonograph.

According to the London "Electrical Engineer" the phonograph is being exploited on the British market for the purpose of teaching foreign languages. Already a complete course in French has been transferred to cylinders by a member of the

Academie Francaise, and these cylinders will presently be obtainable by students who prefer to perfect themselves both in grammar and pronunciation (!) by the aid of a phonograph.—*Electrical World*.

### Romantic Story Involving the Telephone.

A suit commenced in Washington, D. C., on February 25, to secure for Mrs. Alexander Graham Bell her interest in a trust fund of \$200,000, reveals a romantic story involving the telephone. It is generally known that Professor Bell before inventing the telephone was engaged in Washington as an instructor of the deaf and dumb, and that during this period he became acquainted with Miss Hubbard, who was one of his pupils, and a daughter of the late Gardiner G. Hubbard.

Professor Bell became engaged to Miss Hubbard, but before their marriage he entered into a contract with Gardiner G. Hubbard to provide for the creation of a trust fund, of which Professor Bell's wife was to be the beneficiary.

Professor Bell conveyed all his interests in his telephone patents, both at home and abroad, to Mr. Hubbard to hold in trust for Mrs. Bell. As long as the income from these patents did not exceed \$3,000 a year Mr. Hubbard was to pay it to Mrs. Bell. It was provided that when the revenue exceeded \$3,000 a year the excess should remain in Mr. Hubbard's hands until it reached the amount of \$200,000. After this it was to be held as a trust fund, and the total income was to be paid to Mrs. Bell. The trust was to continue during the life of Mrs. Bell, and at her death to go to her children, or, if she had none, to Professor Bell.

The contract was executed on July 9, 1877, and Professor Bell and Miss Hubbard were married. It now seems that Gardiner G. Hubbard's will provided that his entire estate should go to his widow in fee simple without any qualifications. It was discovered after his death that the trust fund amounted to \$259,798. Mrs. Alexander Graham Bell, therefore, under the terms of the trust, believes herself to be entitled to \$59,798 at once as the excess over the \$200,000 provided for in the trust. The suit referred to above is brought to determine this.—*Electrical Review*.

[This suit was a friendly one between all parties for the purpose of making the proper record and the decree in accordance with the equity of the case has since been granted.—ED.]

### Bill to Suppress Fraud.

The following bill to sufferers from fraudulent advertising has been introduced in the New York legislature. A similar measure, if passed by congress, might have a wholesome effect on fraudulent patent agencies and patent solicitors:

"Section 1. Any firm, person or partnership of persons, or any employe of a firm, person or partnership of persons, who, either in the newspapers or other periodicals of this state, or in public advertisements, or in communications intended for a large number of persons, willfully makes or disseminates any statements or assertions of facts with respect to his, her or their business affairs, especially concerning the quantity, the quality, the value, the price, the method of production or manufacture, or the fixing of the prices of his or her or their merchandise or professional work; or the manner or source of purchase of such merchandise, or the possession of awards, prizes or distinctions; or the motive or purpose of a sale, intended to have the appearance of a particularly advantageous offer, which are untrue or calculated to mislead, shall be guilty of a misdemeanor.

"Section 2. Any firm, person or partnership of persons, or any employe of a firm, person or partnership of persons, who, either in the newspapers or other periodicals of this state, or in public advertisements, or in communications intended for a large number of persons, willfully makes or disseminates any statements or assertions of facts with respect to the proprietor or proprietors, manager or managers, practitioner or practitioners of a business or profession; or with respect to the business affairs or professional work of such proprietor or proprietors, manager or managers, practitioner or practitioners, especially concerning the quantity, the quality, the value, the price, the method of production or manufacture, or the fixing of the prices of such merchandise or professional work; or the manner or source of purchase of such merchandise; or the possession by him, her or them of awards, prizes or distinctions; or the motive or purpose of sales, calculated to divert his, her or their trade, or to disturb the carrying on of said business or professional work, or to injure the credit and standing of the proprietor or proprietors, manager or managers, practitioner or practitioners of such business or professional work, which are untrue or calculated to mislead, shall be guilty of a misdemeanor.

### Electricity in Warfare.

The present crisis between this country and Spain will bring into use the latest forms of protecting devices and electric armaments such as have lain in abeyance for the past five years. Some of these appliances, used for attack or defence, will prove very formidable. In naval warfare the search-light, sweeping the sea for miles around, will prove an able means of defence.

Our modern war vessels are equipped with powerful search-lights, which will reach a distance of from two to twelve miles. Modern practice has shown that the best system to employ in order to keep the vessels free from attacks from torpedo boats is one involving the use of many search-lights, because, in the interval during which one part of the sea is dark and another part illuminated, a torpedo boat could glide forward from a distance of two miles and successfully blow up the vessel. It is, therefore, necessary to sweep the ocean with the luminous rays and keep every inch of it as far as possible under inspection.

In the control and management of the fish torpedo we deal with a device depending absolutely upon electricity for its propulsion, guidance and subsequent explosion. The torpedo is projected from a steel tube at the enemy's war vessel, and when in the water guided by its own devices. It forms a powerful means of attack, and with the proper number a given line of advance may prove impregnable.

Naval vessels frequently make use of the electrical log for measuring the speed of the vessel, and although such a device will not give the velocity at any instant, it will enable the executive to judge of the rate of progress in any given case. Battles in the future between civilized nations may become to a large extent a war of push-buttons—the pressure on a key being sufficient to set in action tremendous forces or deliver a volley of projectiles of deadly effect. The U. S. dynamite cruiser "Vesuvius" discharges projectiles from pneumatic guns which are subsequently exploded by a charge of electricity. Each projectile carries six hundred pounds of highly explosive material and will wreak a terrible vengeance wherever it strikes. A few dry cells are carried within the projectile and raise to incandescence a platinum wire which is surrounded by fulminate of mercury, thus causing an explosion of the main mass of material. This last method is employed whenever explosives, such as dynamite, gun cotton, etc., are to be dissipated—a detonating charge being found most effective.

In submarine work for boats built on the plan of the famous "Nautilus" of Jules Verne, such as the Holland submarine boat, experience has shown that electricity is the only force that can be successfully employed. A war vessel will find great difficulty in protecting itself from so invincible a destroyer as a well constructed and properly controlled torpedo boat. Its power of doing evil is almost beyond calculation, and when in operation it may remain at a safe distance and project its deadly missile against the comparatively unprotected bottom of the most massive war vessel ever built.

The Fiske range finder represents in many respects the crowning success of this age, as it enables an operator far removed from the scene of battle to train a swiftly moving explosive device with unerring accuracy upon any given point within its reach. A fish torpedo may be directed along given lines to an enemy's ship and steered with a touch of the finger from shore with almost absolute certainty.

The control of submarine mines from any given point along the shore is so effective in case of war as to absolutely prevent entrance by an enemy into any harbor or body of water. It is but necessary to make an extensive employment of these means and a coast will be safe from the ravages of marine assaults, its maritime ports ably protected and its freedom from immediate danger apparent and pronounced. On land the telephone and telegraph have their parts to play, and a new institution, the war balloon, gives to an observer therein a bird's-eye view of the country of the utmost value. Communication between this aerial device and the earth can be easily carried on and the movements of an enemy laid bare in detail.

It is but little for us to say that the future of war and even its possible discontinuance will depend greatly upon the development of electrical devices in naval and land warfare. It may be as Bulwer-Lytton has said "that when each nation is capable of exterminating its neighbor war will cease, with its horrors, misery and bloodshed."—*Electrical Age*.

"Success" an illustrated literary magazine has made its appearance. It is edited by Orison Swett Warden, and promises to be what its name indicates. The first number contains a very interesting interview with Thomas A. Edison in his workshop at Menlo Park, N. J.



### Patent Legislation.

The report of the Patent Law Association's committee on laws and rules—made February 12, 1898—is one of much interest to patent attorneys and inventors. In it are given, under their respective numbers, various congressional bills of importance relating to patent matters, as are also given a number of worthless, trivial, and, one at least, decidedly injurious. The latter is the notorious bill to permit anyone to manufacture any patented invention by paying a royalty to the commissioner of patents. No congressional report has been made on this.

The bills especially cited in the association's report are the following:

H. R. 6,650, to amend certain sections of the revised statutes to relieve the office of the commissioner of patents; H. R. 7,082, for revising and perfecting the classification of letters patent, and printed publications in the patent office; H. R. 6,349 (not reported), which concerns the recognition of agents, attorneys, or other persons representing applicants for patents before the patent office; H. R. 7,083, to establish a patent court of the United States and for other purposes (not yet reported); H. R. 6,350, the "patent office bill," (still in committee); H. R. 7,346, 2,807, 33, and 3,128 (not reported) relate respectively to enabling guardians of insane persons to apply for letters patent; to revising and amending the statutes relating to patents; and to trade-marks.

H. R. No. 7,082 was favorably reported by the house committee on patents and placed on the calendar for passage. In its report the committee say in part:

"It is a well-known fact with those acquainted with the patent office that it is impossible to make such a search as is required by the statute, owing to the lack of proper classification of the literature in the patent office. This unfortunate and oppressive condition of affairs must continue until the patent office is provided with facilities for making searches thoroughly. The United States government has issued about 600,000 patents; the governments of foreign countries have issued about 750,000. Technical books and journals, descriptive of inventions, have been issued for years. In order that a thorough search may be made into the question of novelty, it is necessary that this whole field of invention described in these patents—more than a million in number—and the technical publications should be examined. The present force of the examining corps of the patent office is inadequate to perform the current work of examination, to say nothing of the classification of the patents and publications already in the patent office and those received from day to day. Owing to this lack of force and of classification, the work of the patent office is and has been falling hopelessly behind, to the detriment of inventors, manufacturers, and the general public, the work now being from two to seven months in arrears and the office struggling with a load much too heavy for the present force to carry.

It is the object of this bill to provide the necessary force to classify the literature of the patent office in which searches are to be made. While considerable expense will be involved, the patent office is fully able to bear this additional expense, as the money paid into the patent office as fees by inventors, manufacturers, and owners of patents exceeds its expenditures by more than \$300,000 a year. The bill provides for the employment of additional force, involving the expenditure of \$62,880 a year, only a small part of the annual surplus.

The commissioner of patents is of the opinion that if he be given force sufficient to carry on the work of classifying the literature in his office, the income of the office will be greatly increased by the more rapid and thorough disposal of the business and the increased number of applications which may be filed when it is assured that action upon them will be prompt and thorough."

H. R. No. 7397, for revising and amending the act of March 3, 1897, was favorably reported and put upon the calendar. It enacts as follows:

"That section 4887 of the revised statutes, as amended by the act of March 3, 1897, in so far as it provides that no patent shall be granted in this country for an invention previously patented or caused to be patented in a foreign country by the inventor or his legal representatives or assigns, on an application filed more than seven months prior to the filing of the application in this country, and section 4886, as amended by the said act, in so far as it implies that a patent may not be obtained for an invention patented or described in any printed publication in this or any foreign country more than two years prior

to the application for such patent in this country, shall not apply to any applications filed complete in the patent office prior to the expiration of the sixty days next following the passage of this act, but any patent granted on an application filed more than seven months after the filing of an application on which a patent has been granted to the inventor or his legal representatives or assigns in any foreign country, or for an invention patented or described in any printed publication in this or any foreign country more than two years prior to the filing of the application for a patent therefor in this country, shall be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest term, and in no case shall it be in force more than seventeen years."

In its report on this measure the committee make a preliminary statement, which we give in part as follows:

"Congress, by an act approved March 3, 1897, amended the law relating to patents so as to provide that no patent shall be granted in this country for an invention previously patented in a foreign country on an application filed more than seven months prior to the filing of the application in this country. By the terms of this act it went into effect on January 1, 1898, and all applications not reaching the patent office at Washington before that date were debarred from the benefits of our law. It has been found upon investigation that this radical change in our law, that existed for almost a century, has worked much wrong and hardship to American citizens and inventors generally, and in many cases has injured citizens of other countries who extend to us reciprocal favors of like character, and the committee on patents, after full hearing and consideration, unanimously report the herewith submitted bill, so as to relieve the persons who have suffered by reason of not sufficient time and notice being given of this very radical change in our law, or such as having received notice and endeavored to comply with the law were prevented from so doing by accidents or causes not within their control.

It is very probable that congress will soon give attention to patent affairs, and that the not distant future will see much improvement in this particular.

### Death Rate of the Spanish Army in Cuba.

Inspector-General Losado, of the Spanish forces in Cuba, recently issued his official report, says the Medical News, in which are indicated losses almost without precedent in modern times. His report shows that out of the 200,000 soldiers sent by Spain to put down the insurrection in the island from the beginning of February, 1895, to the beginning of December of the year just terminated, not more than 53,000 (a little over one-fourth) are at this moment fit for active service. The 147,000 are either dead or sent back to the motherland ill or wounded. The cause of this unprecedented death rate and sick list are (besides casualties in action) mainly three: (1) the inappropriateness of the clothing furnished to the European troops; (2) fatigue; and (3) lack of food. The report, which does not apparently err on the score of reticence, paints a lurid picture of military service in the chief Spanish colony. Under successive generals the three year's campaign, in spite of numberless royalist "victories," leaves Cuba as precarious a Spanish possession as ever; while a whole generation must intervene before island and motherland alike can recover from the loss of blood, property and treasures.

### Warping of the Eiffel Tower.

At a recent meeting of the French Academy of Sciences, Col. Bassot read an interesting paper tending to establish the fact that the great French tower has a daily movement of considerable magnitude. He explained that the expansion of the metallic components of the structure produces a torsion movement from sunrise to sunset, which traverses a curve of 10 centimetres. This movement is repeated in an inverse direction during the night, as the column becomes cooled, so that the lightning rod on the summit of the tower is in constant motion. Col. Laussedat, director of the Conservatory des Arts et Metiers, confirms Col. Bassot's statements. He says the tower simply obeys the physical law of temperature influence. In the summer the expansion is greater than that in winter, and the movement reverses at night, owing to contraction due to the cooling down of the mass. Yet this torsion will in no case compromise the solidity of the structure, which is absolute. The constructors had, at the time of erection, all this in view, and calculated for it, so that while the matter is one of interest it is neither startling, nor, from a mathematical standpoint, of serious importance.—*Trade Journal's Review*.

### Bessemer's Gift to Civilization.

The Bessemer process of making steel has been one of the great inventions of the century. In a direct and indirect way it has proven to be a benefactor to mankind. Everybody that uses steel is a debtor to the dead metallurgist. Since its practical adoption it has raised the output in Great Britain alone from an annual product of 50,000 to 10,000,000 tons, with that of the United States making a phenomenal record. Forty years ago the current price of the metal was from \$250 to \$300 a ton, since then it has declined to \$20 to \$25 a ton. It enters into all kinds of industries, and in structural uses it has practically relegated wood for such purposes to a subordinate position. From biographical data given by not only the technical press but such papers as the New York Tribune, the following facts in a life of unceasing study, research and invention are given in order of their occurrence. His father was a member of the French Academy, improving the microscope, building a floating engine for pumping purposes, improving the methods of type-founding, and in fact displaying an inventive genius at the age of twenty-five that was remarkable. During the French revolution in 1792 he immigrated to England where his son Henry was born in 1813. At an early age he developed a taste for sculpture, some of his statuary being exhibited at the Royal Academy. At the age of nineteen he devised a perforating stamp for cancelling stamps and bills. This was given to the British Government, and in recognition of its service he was knighted by this slow moving body. After this he was known as Sir Henry Bessemer. He afterwards invented a method of casting type free from blow holes, a preparation of bronze powder for painting and decorating, and also made improvements on the centrifugal pump. The Crimean war turned his attention to the manufacture of cannon and projectiles. After this came some crude attempts at turning pig iron into steel. He made a statement of his new process in a paper read before the British Association for the Advancement of Science. Manufacturers saw the point and commenced work, but failing to secure the same results as the inventor, his discovery was pronounced valueless. After a series of experiments entailing patience, hard work, more or less of public renunciation, and exhaustive mental toil, he finally overcame every stubborn difficulty, and presented the world with his epoch making discovery. In closing an admirable review of his life labors and its eventual triumph the New York Tribune says: "After demonstrating the success of his process he had the world at his feet. It is gratifying to know that, aside from countless honorary titles and decorations received from governments and societies all over the world, Sir Henry reaped a fortune of about \$5,000,000 from this one source before the expiration of his patents." In a comment on this wonderful success the Manufacturer says: "In this country where the Bessemer process has enjoyed such wonderful development we have more characteristically honored the great English inventor by naming iron and steel towns after him. There is a Bessemer in Michigan, in the Gogebic iron range, a city and county of Bessemer in the Alabama iron district, a Bessemer in Western Pennsylvania, the seat of the Edgar Thompson Steel Works, ranking among the largest in America, and a Bessemer in Indiana, in Virginia, in North Carolina, in Wyoming and in several other States of the Union."—*Age of Steel*.

A summary of the American window glass industry has just been compiled. The total operation is represented by an equivalent of 1,876 pots, of which 1,610 are in the Indiana-Pittsburg district. At no time in past years has over 1,750 pots been operating at any one time. The total monthly output of these plants will run 680,000 boxes, while the normal monthly consumption is 440,000 boxes. Of the pots in operation all but 161 are controlled by the American Glass Company. These can only produce 68,000 boxes per month. The accumulation from now until the fire closes, July 1, will probably be sufficient to run the country until October 1.

Japan is now building a great steel plant. The works will cost \$10,000,000 and will be put into operation within three years. This steel plant, which will be situated at Yawatamura, a town of about 10,000 inhabitants, is on the extreme northern end of the island of Kishiu. This island, according to reports, is rich in coal. More than 3,000,000 tons of coal are said to be taken out of its mines yearly. The ore beds from which the mill will get its supply of iron ore are on a neighboring island, the two being separated by a channel only a mile wide. The ore will be brought from one island to the other by boat.



### The Paris Exposition of 1900.

It is a foregone conclusion that the French will do their "level" best to make the coming Paris Exposition of 1900, excell anything in the "show line" that has yet delighted an admiring world. The Exposition will be held on the public grounds, extending on both sides of the river Seine, from the place de la Concorde, to a point beyond the Point de Jena, comprising the Champs de Mars, the Trocadero Palace, the Esplanades des Invalids, the Quai de la Conference, the Cours de la Reine and a portion of the Champs Elysees.

In the management for exhibitors, each building will be devoted to a certain class of exhibits, in which each nation must confine its class product. There will be no great foreign buildings for this purpose as there were at Chicago.

The groups of exhibits will number 18 and the classifications 120. Group V, will contain the electrical department; and in this Johny Crapeau will undoubtedly endeavor to astonish the beholders. He will also give them a lesson in conducting the electric current from a long distance, delivering it by means of a high tension transmission circuit to the Exhibition grounds. There it will make day of night operate the vast machinery systems and perform many wonderful and beautiful phenomena of which it is capable.

One of the very interesting of these performances will be in connection with an electric organ, and a tiny ballet dancer, the latter appearing in the air above the organ when the latter begins to play.

Electricity will be the chief feature at the Paris Exposition. The power source it is probable, will be located 100 miles away, at the coal mines of Nord and Pas de Calais, and the practical demonstration of operating armatured machinery from a long distance will be well illustrated.

### New Method of Drying Hides.

Mr. Daniel Hays, of Gloversville, N. Y., one of the largest glove manufacturers in the country, has recently procured two important patents through Messrs. O'Meara & Co., Solicitors of Patents, Washington, D. C. His latest invention relates to a method and apparatus for fulling and drying hides and skins, preparatory to coloring and finishing. This process has heretofore been accomplished by hand, each skin being agitated in the vat containing the oil and then taken out and dried, and these operations repeated until the skin is thoroughly worked and softened.

The objections to this old process were that it required from six to eight days, and then the ends of the skin were always harder than the center. The process and apparatus patented by Mr. Hays completely obviates these objections, inasmuch as his process can be accomplished in about one day; thoroughly works and softens the skin throughout, and practically requires the use of no skilled labor.

Briefly speaking, his process consists in agitating the skins in the vat containing the softening oil, and simultaneously subjecting said skins to air blasts, either from the side, ends, top, or bottom. In this manner the skins are thoroughly worked and dried, and the article produced is superior to anything provided by the old method.

This process and apparatus bids fair to revolutionize this step in the method of making gloves.

### Wanted—A Gold Cure.

It is said that Mr. E. C. Brice has been so much ridiculed by the press, on account of his gold-making idcas, that he has concluded to give the "golden secret" of his formula to the public. As given by the Chicago Inter-Ocean, it is as follows:

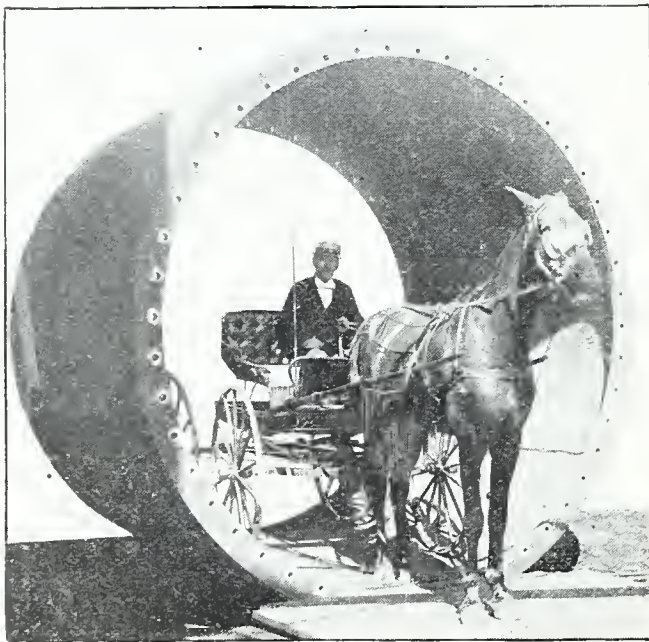
Chemically pure antimony, 5 parts; sulphur, 10 parts; iron, 1 part; caustic soda, 4 parts. Place these ingredients in a graphite crucible and expose to a white heat, or 5,000 degrees, from eight to forty-eight hours. Powder the resulting mass and mix it well to incorporate the metal with the slag. Combine this with charcoal, one part; oxide of lead, five parts, and caustic soda, four parts. Fuse the whole until a metallic button is obtained. Scorify and cupel this metallic mass and the resulting lead will be gold and silver. There is a possibility for a great demand soon for certain minerals. But there is no danger of the mints being worked overtime.

In a recent lecture on the subject of compressed air, says Yale Scientific Monthly, these facts were demonstrated: Air when liquefied looks like water, and has a temperature of 385 F. below gas. If an alcohol thermometer be plunged into it the alcohol is immediately frozen. Alcohol being ordinarily frozen at 200. When the bulb and contents are withdrawn, it takes some little time to liquefy

the alcohol again, as it has frozen very compactly. The experiment of pouring liquid air into a few ounces of whiskey was undertaken, with the result that the fluids became solidified into a mass resembling a stone or mineral. The smell of the whiskey was however given off in the solid state. When a handkerchief was dipped into the liquified air it dried very slowly and caused the fabric to have a charred appearance when completely dry again. It would seem foolhardy to thrust the hand into a liquid which can produce such an extreme temperature, but it was proved that no harm would attend so doing, provided it was done quickly enough. The explanation being that a small quantity of the liquid evaporates and forms a thin gaseous film over the surface of the hand and will protect it even though there be a difference of 480 between the hand and the liquid.

### A Mammoth Tunnel Pile.

The accompanying illustration will perhaps give a better idea of the possibilities of pipe-making than can be had from a figure statement. In the latter particular the section of cast-iron pipe presented—which is a portion of the permanent inlet-shaft to the new 9-foot water supply lake tunnel at Cleveland, O.—is 8-foot 7 inches long, and 11-feet in



diameter, 2½ inches thick, and weighs 13½ tons. Seven of the sections of this great pipe shaft are flanged and bolted together, and are surmounted by 4 lengths made from ¾-inch steel plate, the diameter being the same as that of the cast-iron sections, the length being 7-foot 6 inches.

We are indebted to the courtesy of the Railway & Engineering Review for the cut and information here given.

### Electricity in War.

In case war is declared by the United States on Spain, it is probable that the electrical fraternity will play a very important part in whatever actions may ensue. The setting and operation of submarine and subterranean mines involve considerable technical and engineering skill and a knowledge of electrical engineering. The American Institute of Electrical Engineers numbers among its membership many expert electricians who would undoubtedly volunteer their services to the government for such work. A number of electricians have already enlisted as privates in the two new artillery regiments recently created, and it is undoubtedly a fact that when the real need of the services of trained electricians is made apparent, it will be at once met by volunteers.—*Electrical Review*.

### To Saw Off Limbs.

The Philadelphia Record states that a four-inch circular saw for the amputation of limbs is being installed at the Emergency Hospital at Boston. An electric motor will furnish the power to run the device. The saw will be mounted on a flexible shaft like that which a dentist uses, only larger. The bearings, in which runs the saw arbor, are attached to a handle by which the surgeon is able to direct the saw at any angle. Dr. Galvin and his assistants will be able to save considerable time by the use of this appliance. Not only does the saw cut much faster than a hand tool, but the heat of its rapid cutting sears the flesh and blood vessels and the healing processes of nature are advanced to a stage which by the old method is reached only after an hour or two.

A man's lungs may contain 200 cubic inches of air.

### Books and Magazines.

APPLIED PHYSIOLOGY FOR ADVANCED GRADES.—Including the Effects of Alcohol and Narcotics. By Frank Overton A. M., M. D., Late House Surgeon to the City Hospital, New York. Cloth. 12mo, 432 pages. With Illustrations and Diagrams. Price, 80 cents. American Book Company, New York, Cincinnati, and Chicago.

This book has been prepared to meet the requirement of teachers and schools for a modern text-book of Applied Physiology, which should embody the latest results of study and research in biological and chemical science, and the best pedagogical methods in science teaching. It represents a new and radical departure from the old-time methods pursued in teaching physiology. It begins with the study of the cells of the body as the units in which life exists and acts, and with this as the basis of treatment, shows their relation to all the elements of the human body and all the processes of human action.

Other distinctive and valuable features of the book are the arrangement of summaries and review topics at the end of each chapter; the list of subjects for original demonstrations and the use of the microscope in connection with the study; the special treatment of hygienic subjects, as air, ventilation, drinking water, sewage, clothing, bathing, bacteria, repair of injuries, etc. The effects of alcohol and narcotics are treated in a judicious and scientific manner, not in a separate chapter, but in connection with the several topics and subjects treated in the book. The book is not only modern and scientific in treatment, but it is written in such a clear and direct style as to make every subject interesting and comprehensible. The topical arrangement and clear typography of the pages will render the use of the book convenient and satisfactory.

### War Materials.

The war department, on March 18th, awarded the following contracts for war material: Midvale, Pa., Steel Company, 680 12-inch deck-piercing shell of 800 pounds each, and 344 12-inch deck-piercing shell of 1,000 pounds each. Carpenter Steel Company, 150 8-inch and 300 10-inch armor piercing shot, 150 armor piercing shell, 250 12-inch deck-piercing shell of 800 pounds each, and 228 12-inch deck-piercing shell of 1,000 pounds each. Sterling steel Company, 100 8-inch and 250 10-inch armor piercing shell, 150 10-inch armor piercing shot, 250 12-inch deck-piercing shells of 800 pounds each, and 205 12-inch deck-piercing shell of 1000 pounds each.

The use upon articles put on the market in the United Kingdom of Great Britain and Ireland, of a trade-mark with the notice "Trade-mark registered" is prohibited by law if the trade-mark is not actually upon the register in Great Britain at the time the articles are offered for sale. American manufacturers using trade-marks in connection with goods to be sold in England will therefore either have to register their trade-marks there or, failing in this, they should omit from the goods or labels all reference to the trade-mark being registered. In many cases this will necessitate the printing of special labels for the English market.

The increased price of labor and paper materials in Japan since the Chinese war have so increased the price of paper production as to enable the Americans to furnish a cheaper news, and two-thirds of the Tokio newspapers are printed on American paper. The quality is inferior to the native print, but it costs but \$5.50 per 100 pounds, while the Japanese product is quoted at \$7 and \$8.

After a long debate, on March 22, the bill to substitute electrocution for the gallows as a method of capital punishment in Massachusetts passed the House. The bill also provides that all executions shall take place at the state prison between midnight and sunrise, and carries with it an appropriation for a small building and the necessary appliances.

A German papermaker has recently obtained letters patent on bottles made of paper, for use on board ship. The new bottles are made of a composition which, with the solution in which they are made water-tight, is still the inventor's secret. After being impregnated with this fluid the paper bottles are slowly dried in gas ovens.

Electric carriages will take the place of the cabs drawn by horses which are owned by the Owen H. Fay Livery Company, of Chicago. The change is to be made within 30 days. The cabs are now being built by the Fischer Equipment Company under designs and patents of C. E. Woods, of Chicago.

The average loss of life in mines is one in 602 persons.



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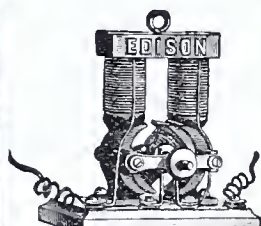
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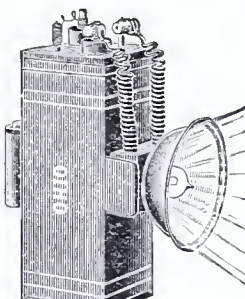
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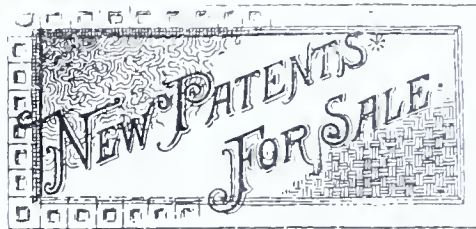
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He is five years older than Bismarck whose knowledge of the guilty secrets of empires makes monarchs tremble in their capitals. He is nine years older than Queen Victoria, the splendors of whose jubilee have gone with the pageants of Nineveh and Tyre. He is a year younger than Secretary Thompson, the veteran statesman of Indiana, who has seen every president but Washington.

Had Lincoln survived he would have been a year older than Senator Morrill. He is thirteen years older than Secretary Sherman. He was past his majority at the birth of Garfield, who has been dead seventeen years, and was in the maturity of manhood when McKinley was born.

James Madison was President in 1810; our population was 7,000,000; Cincinnati was a squalid hamlet and the name of Chicago was not written on the map.

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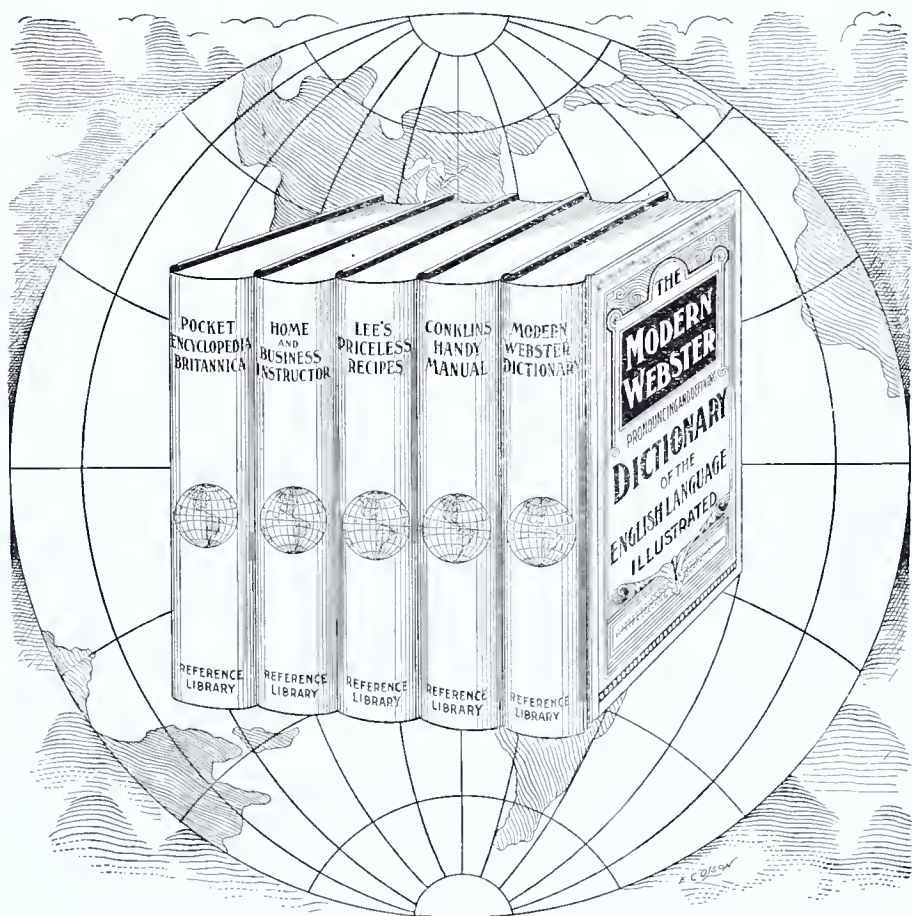
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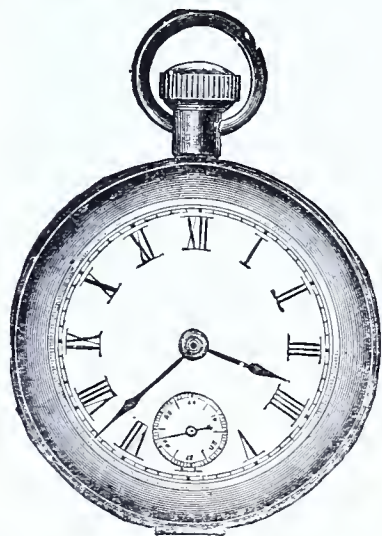
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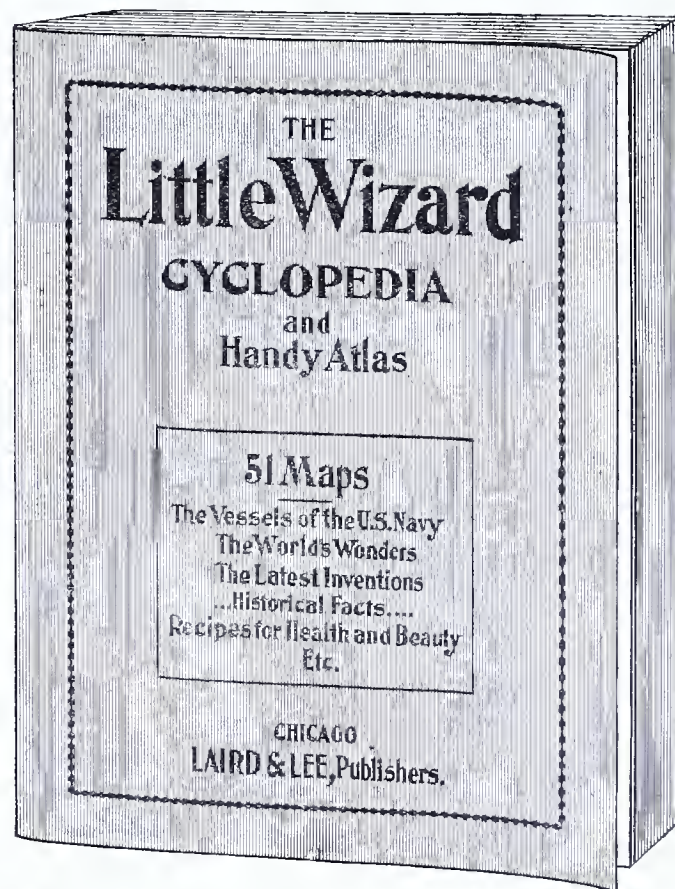
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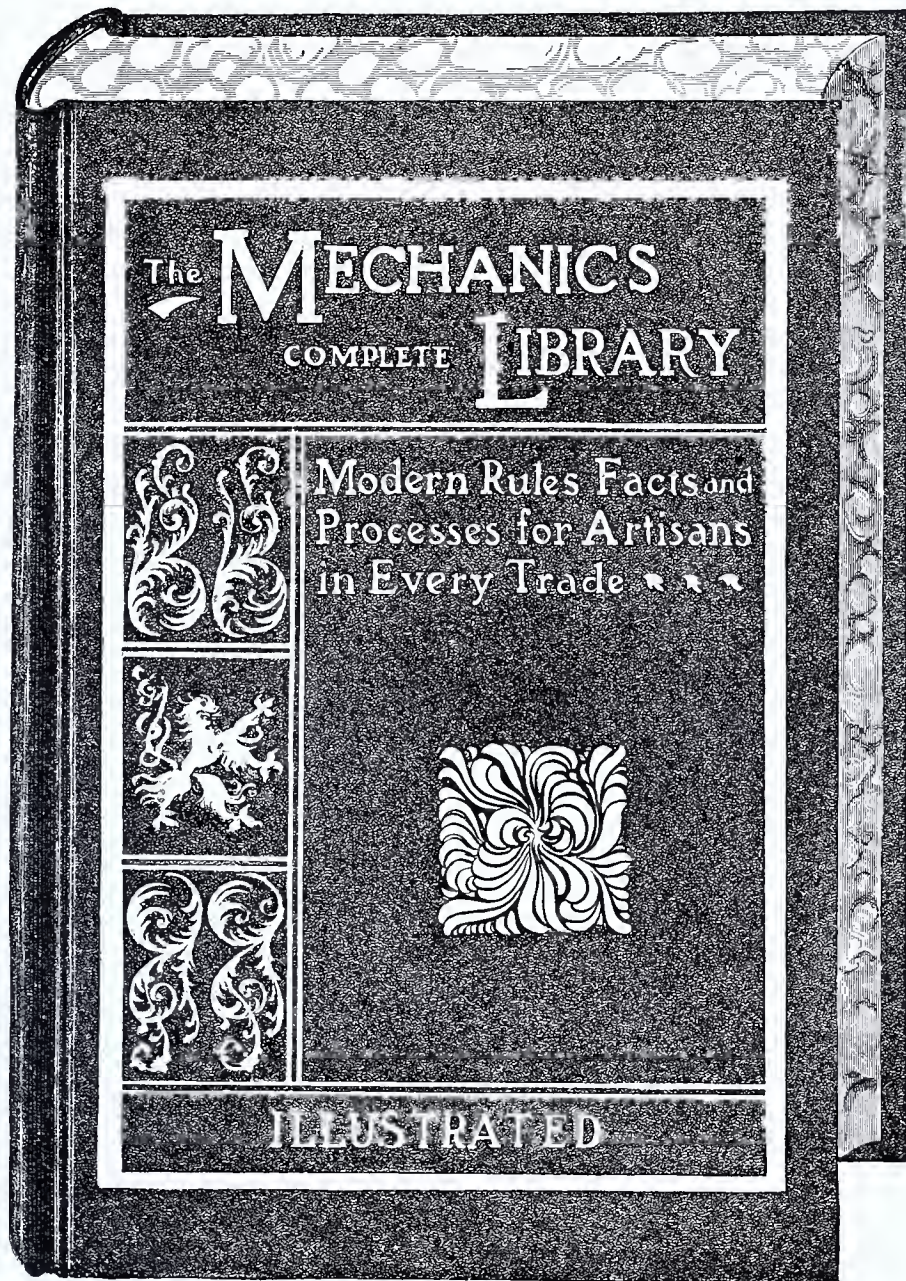
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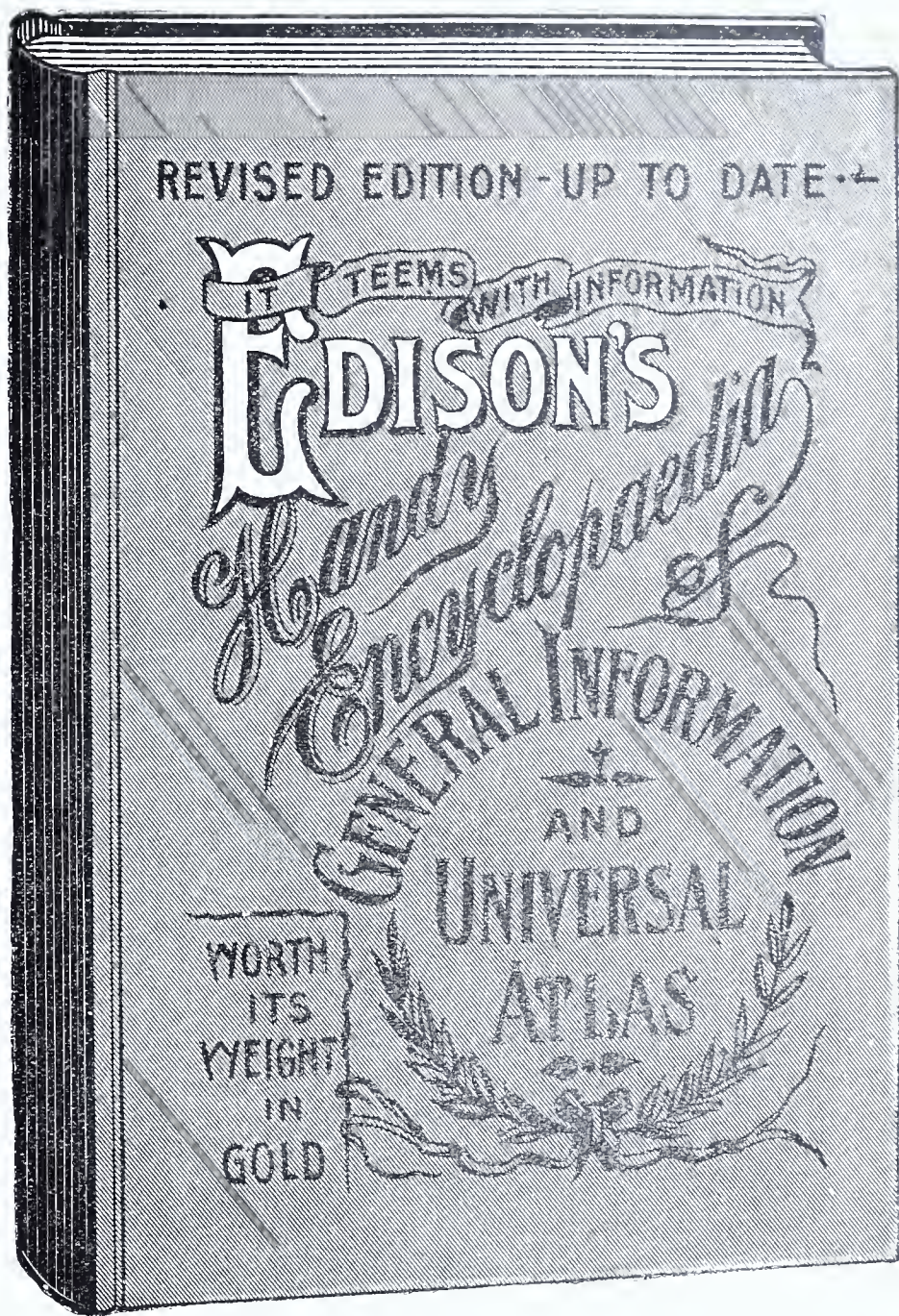
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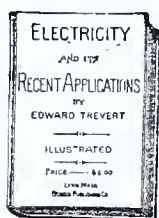
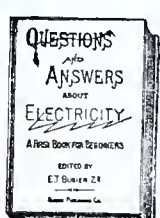
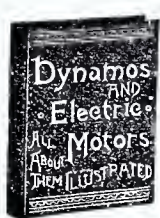
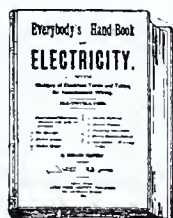
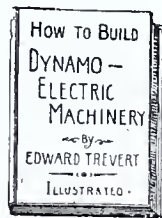
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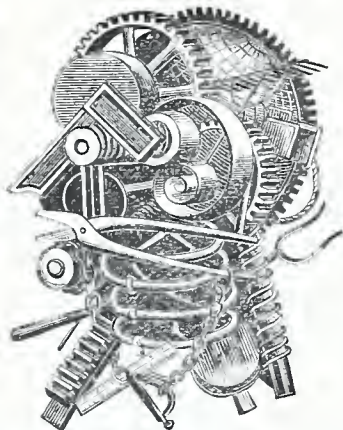
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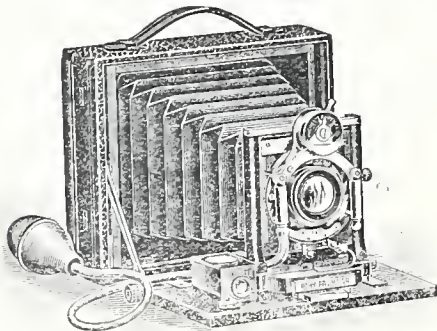
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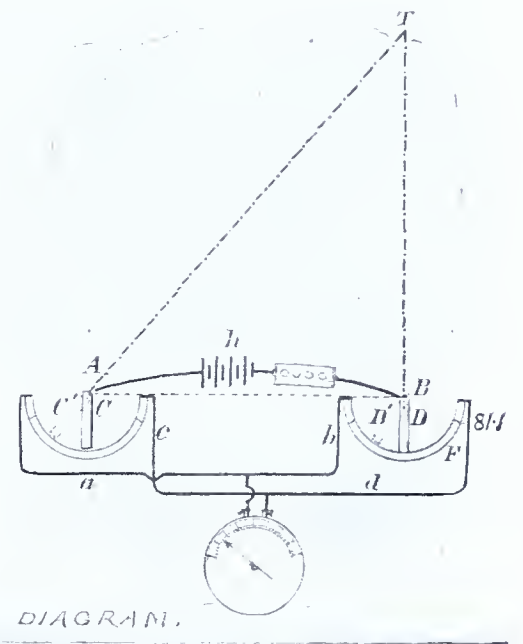
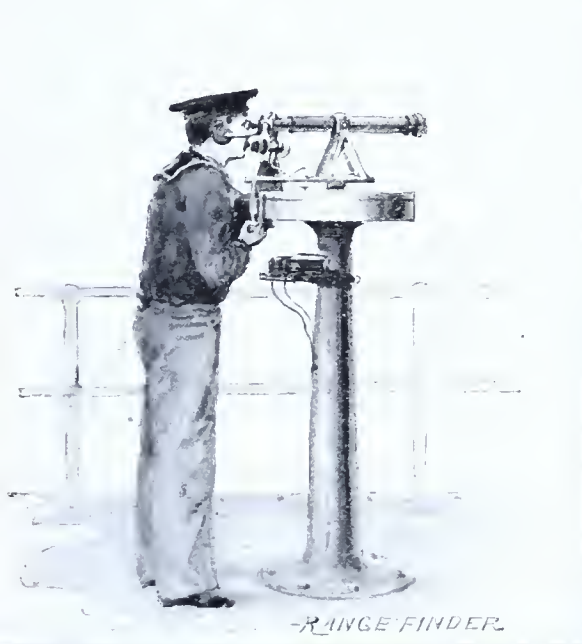
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The correct elevation of the gun can only be determined if the distance of the target is known.

thrown from the sides of the wooden fighting ship.

In the early days, the determination of the range was a matter of guesswork. The gunner assumed a distance, elevated his gun accordingly and



### THE FISKE RANGE FINDER FOR DETERMINING THE DISTANCE OF A HOSTILE SHIP OR FORT.

same gun fell within thirty yards of each other, and the exact determination of the distance of a moving object is a problem that has worried the modern rifle is laid upon the target, with proper gunner ever since the day when round shot was first

watched the course of the shot. If it fell short, he increased the elevation, and if it passed over, he  
(Continued on page 67.)



# The Inventive Age

Established 1889.

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The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for \$1 a year; to any other country, postage prepaid, \$1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

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WASHINGTON—NEW YORK, MAY, 1898.

ONE of our American vessels went down—the Holland.

THE death-dealing device inventor is just now very much in evidence.

SPANIARDS will be granted no patents in the United States during present conflict.

SINCE the adoption of the new rule about 2,100 attorney's have been registered in the United States Patent Office. Those appearing in our Directory on another page are registered

THE invention of the air brake was the forerunner of a great industry. During the month of March the Westinghouse Co., built, sold and shipped from its works at Wilmerding, Pa., 16,628 sets of brakes for freight cars.

THE question as to who was the inventor of the shaft governor, now used in high speed engines, seems to establish the fact that the honor belongs to Colonel Gardiner C. Sims, for many years connected with the Arrington & Sims Engine Co., Providence, R. I. It seems that he designed the shaft governor in 1872 and applied for patent in 1873.

THE decision of the Supreme Court of the District of Columbia, refusing application of John Wedderburn for a mandamus to require the Secretary of the Interior to give him a hearing in respect to disbarment proceedings instituted against him, was affirmed by the Court of Appeals of the District of Columbia. This is the last chapter in the famous Wedderburn case.

THE senate having passed the bill providing for revising and perfecting the classification of patents and publications in the patent office, it is hoped the house will give the measure speedy and favorable attention. The bill as amended provides for three instead of four principal examiners, two instead of four first assistant examiners, two instead of four second assistant examiners, six instead of eight third assistant examiners, and five instead of eight fourth assistant examiners.

"BRICK" calls attention to the patriotism of the brick and stone masons of the country, and of Chicago, in particular, where the union passed resolutions on the 18th ult., offering its entire membership of 4,500 to the service of the United States in the present crisis. Organized labor everywhere will respond liberally and enthusiastically, and so will unorganized labor. When it comes to defend "Old Glory," a united people will be found, whose pa-

triotism is not limited or confined to any class, sect, or creed.

THERE were in arrears in the U. S. Patent Office on May 3, the following number of patents: Between two and three months, 1,793; between three and four months, 5,710; between four and five months, 3,233; between five and six months, 2,600; between seven and eight months, 964. Total, 14,300. Designs under one month, 171; trade-marks, between one and two months, 288. The total number of patents issued from April to May 3, inclusive; four weeks, 1,569; designs, 91; trade-marks, 59; labels, 12; prints, 2; re-issues, 3.

SPEAKING of the splendid achievement of Commodore Dewey at Manila, the Jamestown (N. D.) Alert takes occasion to say: "Commodore Dewey, with true Yankee impudence, forced his way into the enemy's harbor and under the guns of forts and warships, fought a battle that must have been a triumph of naval courage and skill. But while the country admires the leader whose name is linked with the fight, it must be remembered that every captain and subordinate officer, every gunner and engineer who trained the big guns and moved the machinery of the big ships is as much entitled to credit for bravery and skill, as the commodore. The guns themselves and the modern explosives are types of the progress of American inventors. To them is due, also, a share in the credit for the success of the fight and the small loss of life by the Americans. There is a hope that modern scientific invention will render weapons and explosives so destructive that no nation will seek to arbitrate by battle questions that should be settled in a peaceful and civilized way. Invention in the time of peace seems, after all, the best hope of a guarantee of peace and settlement of questions by arbitration not red handed war."

THE commissioner of patents has cited the Association of American Inventors of Philadelphia to show cause why they should not be disbarred from practice before the office. The firm is given until June 15 to make answer. This is the firm, whose questionable practices, the INVENTIVE AGE condemned three years ago. Thousands of inventors have been taken in by the seductive literature circulated by this association, but if all inventors had been readers of the AGE—and its warnings had been heeded—the association would have gone to the wall long ago.

THE advantage to this country of a passage way from ocean to ocean, as contemplated by the Nicaragua canal, is forcibly demonstrated at the present time, when a nation's anxiety for the safety of the Oregon is pronounced. She was obliged to go "round the horn" from the Pacific coast, and run the gauntlet of the Spanish fleet, in order to join Commodore Sampson's fleet. What a saving in time, expense and anxiety, there would have been if we had had this new inter-oceanic route.

THE Indian Textile Journal of Bombay, India, the representative publication for engineering as well as textile industries—copies an article from a recent issue of the INVENTIVE AGE on the "contingent fee" system and adds that "the multiplication of legal practitioners in Bombay, owing to the facilities of cheap education, has brought the subject of contingent fees into prominent notice."

THE Mexican government is to have a new capitol building to cost \$5,000,000 in Mexican money. The building is to be 330 feet square and surmounted by an imposing dome. There were over fifty designs presented, the first prize of \$15,000 going to a Chicago architect, an Italian named Adamo Boari, who did some work on the World's Fair buildings.

In 1816, in England, the value of a bushel of wheat was equal to that of a pound of nails. Today a bushel of wheat will buy twenty pounds of nails.

The United States can make 50 per cent more shoes than it can wear.

## Some Patents Pay.

Many inventors complain that "there is no money in inventions nowadays." It is doubtless true that many inventions that are patented fail to return any money to their inventors, but this may be, first, because the patented article is of no commercial use and will not attract buyers, or second, because, while the article may possess very great commercial possibilities, the owner does not possess either the capital or the business tact to push it, or holds it at so high a figure that he drives away all possible purchasers. That patented articles do sell, and sell well, may be seen by all inventors who may look up the business in all its details.

In a recently published paper in Washington, D. C., a compilation of the latest sales of patents showed that one inventor has sold a patented dispensing can for \$600, another sold a graining apparatus for \$500, and another sold a patent on folding wall shelves for \$1,000. The same list showed a patent for the ornamentation of metal surfaces sold for \$800, a clamp for \$5,000, an amalgamating machine sold for \$30,000, a clover feeder for \$5,000, a sleeping car for \$5,000, a fire-proof floor for \$1,200, a weather strip for \$1,000, a boot heel for \$500 and another for \$1,000, a wire fence machine for \$1,200, an automatic ticket holder for \$750, a dispensing can for \$3,500, a dust pan for \$1,082, a coffee-pot for \$1,500, a can-filling machine for \$600, a plow for \$1,000, an auger for \$1,000, a printing and card-cutting machine for \$50,000, a graining stencil plate for \$1,500, a key for \$2,500, a machine joint for \$1,000, a hydrocarbon burner for \$1,700, a gas lamp for \$20,000, and an expansion wheel for \$1,000. Some other patents sold as low as \$100.

Mechanics of the inventive turn of mind may see in such a list a good deal to encourage them. The sales cover only patents. Not one of these inventions had been worked. In each case the sum of money named is paid for the letters patent, and the purchasers make all the investments needed to manufacture and push the articles. One thing to be noted in all the sales is that in each case the article is a practical article. No perpetual motion or mysterious motor sale is recorded. Mechanics should note that it is only practical inventions that can have any commercial value in the estimation of observers. Myteries do not sell. Fads are shunned. Cranks are avoided. Yet, with all the conservatism that characterizes business men, the investors who have attempted to solve practical problems and to supply practically needs can generally secure a hearing and a customer, provided always their ideas are well worked out and put into the concrete and attractive form of a working model. —*The Iron Industry Gazette.*

## Wire Rolled Glass.

This glass, recently invented, is  $\frac{1}{4}$  in. thick, and contains in the center a wire-netting, the meshes of which are a trifle less than 1 inch in diameter. Consequently, the wire does not obscure the light; the wire-rolled glass will resist fire for as long a time as an equal thickness of iron.

There is no patent office in China, and no treaty with the United States regarding copyrights, trade-marks and patents; therefore there is nothing to prevent American books being reprinted, American trade-marks copied, and American patented goods reproduced by the Chinese themselves, though if the infringer were an American the case would be tried and decided by the American consul according to the laws of the United States, and if a foreigner, in accordance with existing treaty between his country and the United States.

Of the 100 different automatic couplers specified in the latest government reports as in use in car equipment in the United States, forty-two are on more than 100 cars each; 23 are on more than 1,000 cars each; 16 are on more than 5,000 cars each, and 9 are on more than 10,000 cars each. There are a few that go to higher figures—to the 20,000 and 30,000 point—and two that go far beyond the 100,000 point.

If Japan, says Consul-General DuBois can increase her foreign silk trade so rapidly with hand-made goods in direct competition with the European machine-made goods, what will be the result when the very best of modern machinery has been introduced into that empire and is operated by its cheap and clever labor?

The first match factory in Japan was established in 1878, and that country now exports matches to the value of more than \$1,500,000 a year.

According to careful estimates, three hours of close study wear out the body more than a whole day of hard physical exertion.

If the surface of the earth were perfectly level, the waters of the ocean would cover it to the depth of 600 feet.



### Science in Naval Warfare.

The battle, which at Manila added so much glory to the fighting record of the American eagle, demonstrated the self-evident fact, that in modern warfare victory on the sea must lie with the fleet, in the armed make-up of which are those things belonging to the latest and best of scientific apparatus applicable to power afloat. Mere size counts for but little if the ship is not protected by highly tempered steel armor; and even the latter is not a perfect security against guns that now form the armament of the best type of modern fighting vessels. And then—as demonstrated in Admiral Dewey's victory—great guns and good ships are not a surety in battle, when those who operate them, although they, the operators, are men of unmistakable (but ferocious) courage, are little practiced in present day gunnery.

In the Manila fight the battle was with the strong—strong in the excellence of naval equipments; in perfect discipline; in splendid marksmanship; in naval tactics, and in undoubted manly courage. Therefore the issue of battle was a foregone conclusion.

Superiority in ships, guns and other naval equipment, count for almost nothing if shot and shell cannot be made to hit the enemy; the latter particular is what guns are built for. Being perfectly aware of this important fact the U. S. Government has spent large sums of money for target practice; and in so doing has made naval gunnery so exact a science that the gunner, while his ship is flying over the heaving sea, can hit a small target and send successive shot through the hole made by the first. And with the range-finder, for telling just how to get an enemy's exact relative position, the problem of hitting the mark is reduced to as near perfection as can be gotten from guns fired from ships at sea.

If this degree of expert marksmanship can be obtained on the ocean, where there is nearly always wave motion, it goes without saying that the land battery should deliver its shot with a much greater degree of precision. (Yet, the Spaniard utterly failed also from this point of vantage).

The accuracy with which projectiles are fired from land batteries is something wonderful, especially so when we consider the size of the guns employed for this purpose. The seacoast defenders consist of 8, 10, 12 and 13-inch rifled cannon and the 12-inch mortar, which are superior to any of their kind elsewhere. Although the 13-inch gun, the largest now in use, is a terrible weapon of destruction, it would seem that the 12-inch breech loading rifle would be sufficient to destroy anything afloat. This cannon, which sends its shot one-third farther from a land battery than when mounted on shipboard, is thirty-six feet in length, weighs 127,680 pounds, and with a charge of 450 pounds of powder, can throw its armor-piercing shot a distance of twelve miles. The velocity of this shot when leaving the muzzle is 2,100 feet per second and an energy of 26,000 foot tons. In from four to six miles distance the shot can disable the strongest ship afloat, and at a range of two miles it will pierce twenty-two inches of solid steel. As to accuracy the 12-inch gun can almost be compared to a fine fowling piece. In a test at Sandy Hook, this cannon, after firing at and hitting a target, had its position shifted and then again adjusted to bear upon the same mark, with the result that the projectiles fired went through the aperture made by the first shot, as accurately as if the gun's position had not been changed.

This perfect marksmanship is also obtained with the big mortar, which, with 125 pounds of powder projects a steel charge of from 1,000 to 1,200 pounds weight. This is a loaded shell, which, dropping upon a vessel's deck, is capable of penetrating the thickest of deck armor now employed.

So, when we take into consideration—in regard to modern ship armament—the gun-power of a fleet it is safe to assume that victory will perch upon the banner that floats, where roar the mightiest cannon operated by the most skillful gunners. But, though there is little, or not any armor that cannot be pierced, still its employment is a most valuable safeguard, from the fact that it is proof, in many

instances, against small shot, and, even at great distance, against those of larger kind, and that when a shell or shot enters an armor-clad ship, it (as in the case of the *Baltimore* at Manila) cuts, or bores a hole instead of tearing a large space, as would be the case if a wooden vessel were the target. Another advantage of the employment of armor and steel frames in the construction of fighting ships, is the absence of splinters following the entrance of a shot, or, especially of an exploding shell. This quick distribution of wood was often the cause, in old time sea fights, of much loss of life and fearful wounds among the ship's crew.

One cannot imagine the quantity of broken and flying wood that would result from such a storm of shot and shell sent from Admiral Dewey's six ships, whose combined capacity was 1,500 shots, of different kinds, a minute. This amount of flying metal of course, was not thrown at the Spaniards in this time. But truly their ships were literally hammered into splinters—and the splinters hammered into the Spaniards.

### Sinking of the Tai Hoku.

Most readers are interested in the final movements of a sinking ship, but opportunity for recording such a scene by means so accurate as photography is not always present. We present the accompanying illustration, reproduced from an enlarged snap-shot photograph, showing the position of the wrecked Japanese steamship *Tai Hoku* as she was about to disappear. This illustration we take from a recent issue of the *Indian and Eastern Engineer*, the same being the last of a series of four views published by that paper, showing different positions of the sinking ship during the 15 minutes preceding the disappearance.

The *Tai Hoku* was built at Middlesboro for the Osaka Steam Navigation Company of Japan to be

study the matter, as caused by the sudden generation of steam and gas when the water reached the boiler flues which, rushing with almost explosive violence through the flues and smokestack, carried with it quantities of soot.—*Railway and Engineering Review*.

### INFRINGEMENT OF TRADE-MARK.

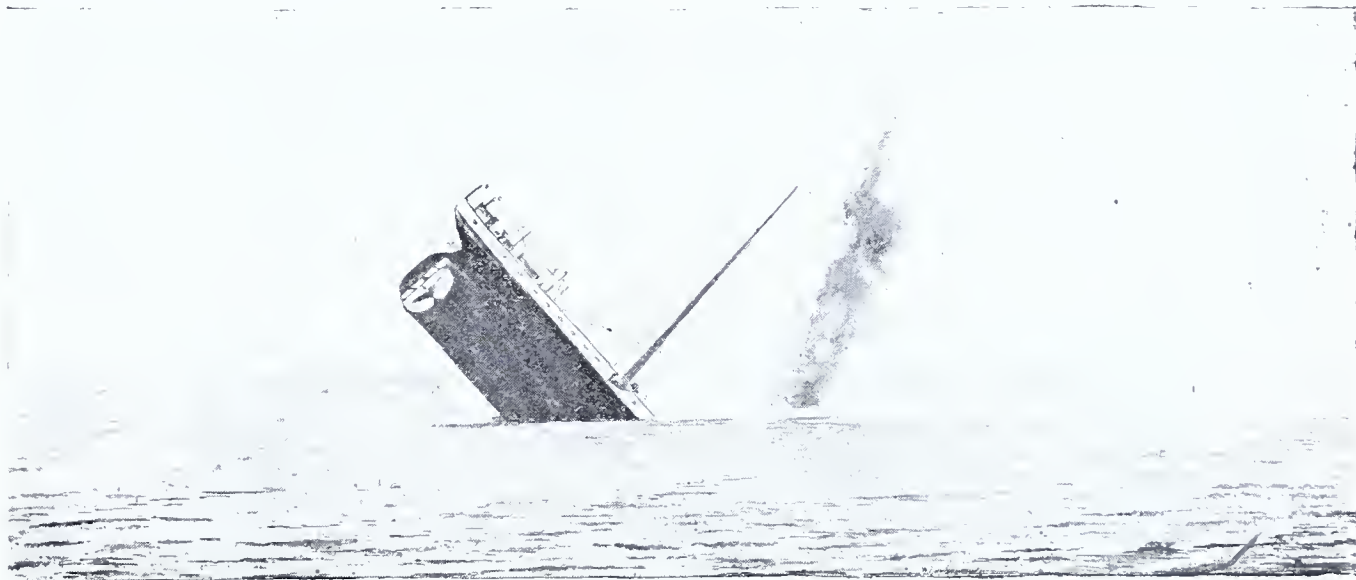
#### Is it Expedient for Congress to Provide a Criminal Remedy?

By ARTHUR STEWART.

A trade mark is the commercial signature of a manufacturer; it is the sign or seal which he stamps upon his goods by which to indicate their origin, ownership, character and quality. It is his guarantee that they are of his manufacture and are worthy of his reputation.

In every department of commercial life, the forgery of the signature of an individual in a business transaction, whereby he is with willful intent deprived of property which otherwise he would have enjoyed, is treated as a crime and the forger is punished criminally by fine or imprisonment or both, and if possible, restitution is required.

If trade-marks mean anything, they stand for, and represent the commercial signature of a manufacturer and they should be afforded the same measure of protection which is given to his personal signature. This fact has been recognized by the law making power in almost every country of the world. There is hardly a nation today on the face of the earth, which has not a trade-mark statute and not one, except the United States, in which the willful forgery of a trade-mark is not treated and punished as a crime. So great is the consensus of opinion upon this subject, that in twenty-two out of thirty-six states of the United States, in which local trade-mark statutes as above stated, have been passed, a criminal remedy for the infringement of trade-marks has also been provided. In cases where responsible parties have competing interests with reference to the same trade-mark and where the use of the trade-mark can be justified in any manner whatever by the



SINKING OF THE TAI HOKU.

used in mail and passenger traffic. She was of about 3,100 tons burden and built to maintain a speed of 16½ knots. On the 6th of July, 1897, she left Antwerp, where she had completed her cargo, en route for Osaka; this was her maiden trip. While in the open sea, off the coast of Spain, in making her way through a dense fog, the vessel came into collision with another steamer, badly damaging her bow. Despite the utmost efforts in working the pumps the hold filled with water so rapidly that 8 hours after the accident the crew and passengers were compelled to desert the ship and take to the boats. The latter were pulled off a few hundred feet, where they lay to watch for passing steamers. It was while waiting in this manner that one of the "kodak fiends" among the passengers took a series of views of the doomed vessel as she gradually sank. The one used for this illustration was taken within two minutes of the time the vessel disappeared.

It is stated that the vessel sank with 60 or 70 lbs. of steam pressure in the boilers, to which circumstance is attributed several interesting occurrences just before she went under. By the collapse of the bridge, the siren and fog horn cords attached to the bridge rail were pulled by sinking pieces, causing these whistles to sound for some time after the foot of the smokestack had been submerged. The engraving displays what is popularly supposed to be the effect of exploding boilers; namely, the vehement ejection of large volumes of steam and smoke. This is explained, by those competent to

alleged infringer, it is far better that the question be decided by the calm judgment of a Chancellor, but in cases where the forger is a simple thief, where he has taken the registered trade-mark of a manufacturer and forged it bodily, name, label, ticket, packing vessel and wrappers, and put the goods on the market with the clear and undoubted intention of selling them as and for the goods of the manufacturer whose forged brands they bear, no punishment can be too severe and no remedy too stringent.

If the bill which is pending in congress, H. R. 3128, be examined it will be found that it has been carefully prepared and its criminal remedies have been drawn so as to include only persons "who with intent to defraud, falsely makes, forges, reproduces, copies or counterfeits, or causes or procures to be made, forged, reproduced, copied or counterfeited any trade-mark duly registered under the provisions of this act, knowing the same to be a fraudulent imitation or counterfeit of such trade-mark." There can be no mistake about this language and it would include no one except a person who would be utterly unworthy of the consideration of a court of equity.

The bill has also been submitted to the criticism of the United States Patent Office and has been made to conform to the suggestions of the office in relation to all matters pertaining to office practice.

It curtails no existing rights but carefully preserves them all, and creates new and valuable remedies.



### Holland's Submarine Boat.

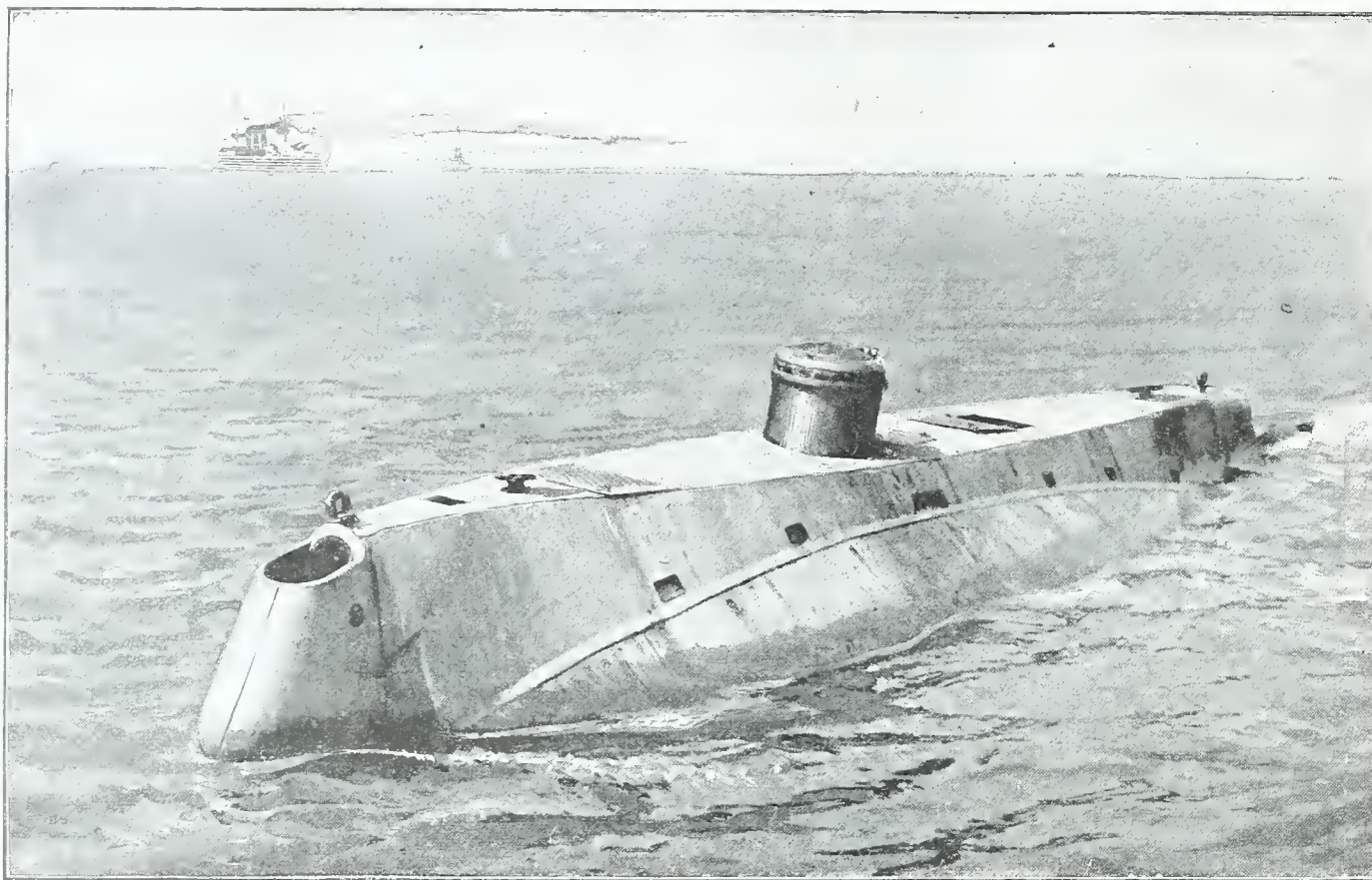
We give in this issue of the INVENTIVE AGE, two excellent illustrations of the modern marine wonder, the Holland submarine boat, of which a description has appeared before in our columns. This important addition to modern sea-fighting power, has proved to a great degree all that has been claimed for it, and repeated tests of its fitness for the work

can project a shell weighing 180 pounds and carrying 100 pounds of explosive material, a distance of one mile. For torpedoes the Whitehead will be used. This carries a charge of 200 pounds of gun-cotton, a hundred pounds more that will be employed for the dynamite gun, which projects its destructive material one-hundred yards through the water.

while the attacked ship, with a huge hole blown in her hull sinks to bottom.

Against such boats as these the chain guard and rapid fire guns of an enemy are unavailable; for the submarine craft can project a torpedo or dynamite shell under any chain protection, while offering nothing for a foe's marksmanship.

Great is the American inventor, who gives us the



THE HOLLAND SUBMARINE TORPEDO BOAT.

intended, have shown the boat to be capable of performing wonderful things both on and below the sea's surface.

When in fighting trim, the armament of the Holland boat will consist of a dynamite gun, an automobile, and an aerial torpedo tube. All these will be discharged by compressed air. The tubes

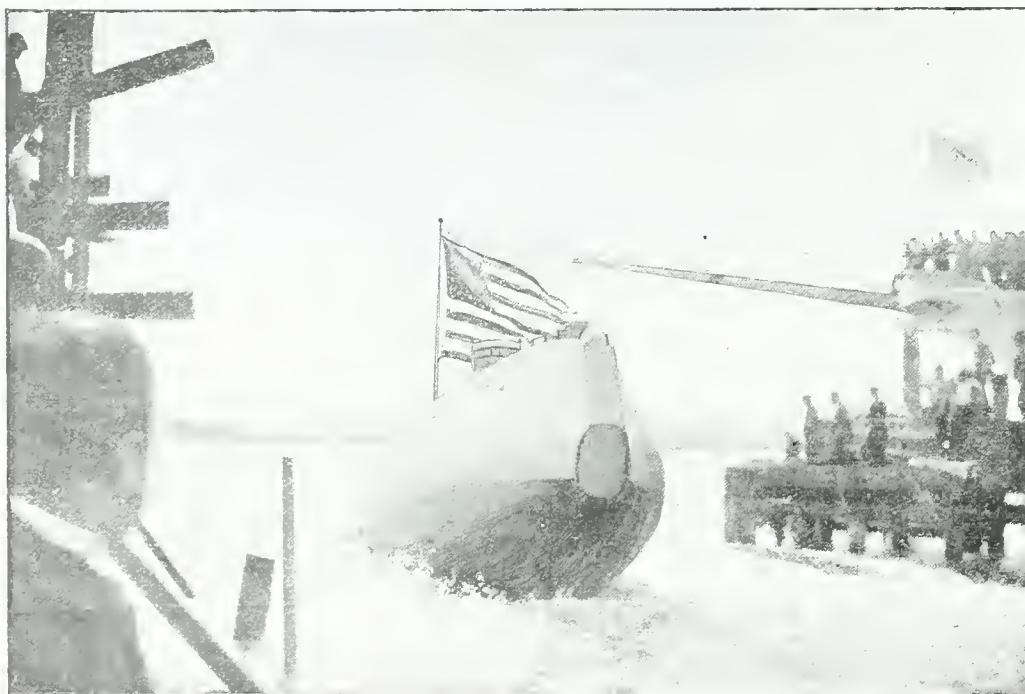
When ready for aggressive business, the Holland boat will indeed be a terror of the sea. With six shots for the bow-gun and five for the one at the stern, she, upon choosing her victim, will sink out of sight and make for the great steel quarry, and when near enough will launch her destructive freight, turn and speed away for a new enemy,

perfection of war mechanism—the man whose genius will one day make war impossible, through the incalculable destructiveness of death-dealing machines.

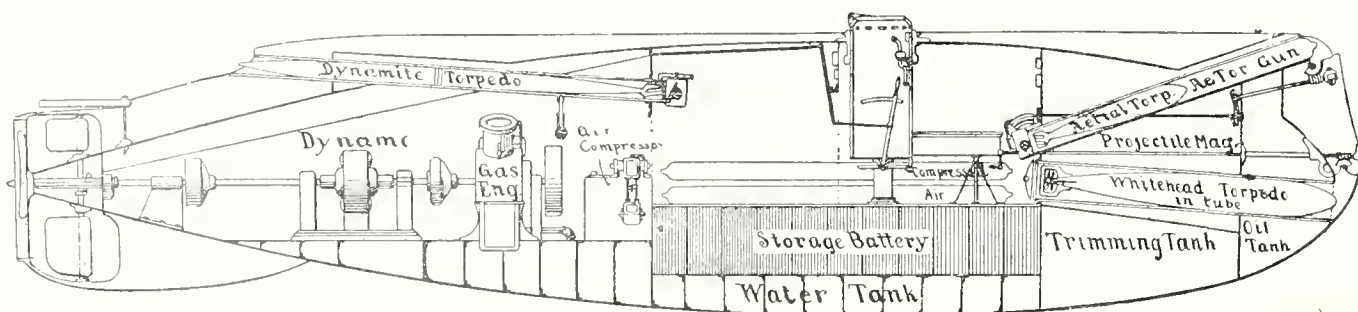
### Interesting Facts About Torpedoes.

Torpedoes are divided into two general classes—stationary and movable. The former consists of the buoyant and ground mine, while the latter class is subdivided into the automobile and dirigible. These terms have been narrowed, says Collier's Weekly, until now the fixed class is generally known as the submarine mine, while the word torpedo is applied to the movable class. The buoyant mines are exploded in contact with or very close to the bottom or sides of a vessel under water, while the ground mine acts at a much greater distance. All mines are divided into other classes, which depend for their nomenclature as to whether or not they are under the control of an operator. In all cases the controlling agent is electricity. The depth of water in a harbor has much to do with the form of torpedo used, and in channels where there is less than thirty feet at high tide the mine case, which rests on the bottom, has the shape of the segment of a sphere with a flat bottom. The electrical apparatus is attached to a buoy, anchored to the case and submerged four feet. The explosive charge is generally about 250 pounds of dynamite or wet gun cotton. The buoyant mine is a hollow sphere, constructed of steel, having a ring at the top for handling, and directly opposite a hole for loading and inserting an electrical apparatus. Over this is fitted a cap for attaching the mooring chain and cable. It is generally submerged about four feet below low water, and the explosive charge is 100 pounds of dynamite or wet gun cotton. A mushroom anchor holds the mine in position. Another form of submarine mine is one which will explode by contact with a ship's bottom; but as these are dangerous both to friend and foe, they are now seldom used in any scheme for defence.

It is reported that Professor Hemingway, an expert in carboniferous products, who lives in Chicago, has invented a new method of extracting coke, which has proved most satisfactory. It will do one thing that hitherto has been thought impossible, that of converting Lignite coal into a good valuable coke. Lignite, which is the most common form of West, has always been used only as a domestic coal, and it had been thought that it could be used for no other purpose.



THE HOLLAND ABOUT TO DISAPPEAR.



LONGITUDINAL SECTION THROUGH HOLLAND SUBMARINE BOAT



## THE FISKE RANGE FINDER.

(Continued from first page.)

decreased it. This was very well in a day when the guns were too feeble to do much execution, except at close range, and a few dozen shots thrown away made little impression upon a ship's magazines. With the advent of modern ordnance, however, with its 60-ton guns and costly charges, the necessity of accurate fire became imperative, and ordnance experts set about devising some scientific method of finding the range at sea. The earliest and best known device of the kind was the invention of Lieut. Fiske, of the United States navy, which has been installed on many of our ships and is widely in use in the various navies of the world.

The Fiske range-finder is based upon the well known principles of land surveying with the transit and engineer's chain. If a surveying party come to a broad river whose width has to be determined, a base line is measured along the bank, and the angles which this line makes with a mark on the opposite bank are measured by the transit. Then, knowing the length of the base line and two angles, the distance across the river can be determined by trigonometry.

Applying this to the range-finder, a base line is carefully measured between two points near opposite ends of the ship, and over each point a range-finder, answering to the engineer's transit, is permanently set up. If the telescopes of the two finders are simultaneously converged upon the same point on a distant object (ship, fortress or city), the observers will be in possession of the trigonometrical data necessary to compute the distance, namely, the base and the two base angles.

In the din, hurry and slaughter of a sea fight, however, it would be difficult to make the necessary calculations, as the distance between the ships, and therefore the observed angles, keeps changing, and in order to make the determination of the distance automatic, Lieut. Fiske placed his telescope in the circuit of a Wheatstone bridge and caused their change of position to record the distance of the object on the graduated scale of a delicate galvanometer. All that was now necessary was for the observers at the two range-finders to keep the cross-hairs of the telescope on the same point of the ship, and the electric current translated (as it were) the angles into distances and recorded them by the movement of a needle over an arc graduated into hundreds and thousands of yards.

On our front page are illustrations which will make the operation of this most ingenious instrument clear to the reader. It represents the "Indiana" about to open fire upon a hostile ship. The converging lines are drawn from two range-finders, which are placed in elevated positions above either end of the superstructure deck. These finders are permanent fixtures, and the distance between them is accurately known. The smaller cuts show a range-finder and a diagram of the telescopes and the electrical connections.

The range-finder consists of a powerful telescope, which is mounted on a standard and is capable of horizontal rotation above a graduated disk. Upon the disk, and extending an equal distance on each side of the zero point on the graduation, is a metallic contact arc. Fixed to the telescope standards is a contact strip, which rotates with the telescope and slides over the contact arcs. In the diagram A and B represent the centers of the disks on two range-finders and C and D the arms that carry the telescopes and contact strips, which are shown sliding in contact with their arcs. The electric current from the battery h, passes through the centers or pivots A and B, and then into the arcs. From the right-hand arc it circulates in the wires, b and d, from the left-hand arc in the wires, a and c, and traverse the galvanometer.

When the two telescopes are parallel, the equilibrium of the Wheatstone bridge is complete and consequently the needle of the galvanometer shows no deflection. This equilibrium occurs, moreover, whatever be the position of the telescopes on the

dial, provided that they are perfectly parallel. But if the telescope, C, for example, be turned until it is in the position, C', the parallelism being destroyed, and, along with it, the equilibrium of the two parts of the bridge, the needle of the galvanometer will be deflected. This deflection will increase in proportion to the length of the arc traversed by the telescope.

But since the arc, C C', is proportional to the angle at A, which is equal to the angle at T, it follows that the deflection of the galvanometer will be proportional to the angle at T, or to the distance, A T. Hence by graduating it in hundreds and thousands of yards, the distance of the ship or fort, T, may be read directly from the galvanometer. One of these galvanometers is placed in the conning tower and one at each of the principal gun stations.

It will be seen from the illustration that the operator, on applying his eye to the telescope, has opposite to his mouth a telephone transmitter, a receiver being clamped to his ear. By this means the two operators are kept in constant communication and the errors are avoided that would be caused by the reading of a deflection produced before one or other of the telescopes is well directed toward the point to be observed.—*Scientific American*.

## A Thawing Machine for Klondike.

An important invention to Klondike immigrants has just been patented by George Leyner, a mining machine manufacturer of Denver. It is known as the Leyner Klondike Frozen Ground Thawer, and, as indicated by its name, the machine is intended to thaw out the ground in the Klondike mining regions. The material used is gasoline converted into gas by the injection of compressed air. A tank similar to a soda water tank, with a capacity of 18, is charged with 12½ gallons of gasoline. An ordinary bicycle pump is used for the purpose of injecting the air, and a pressure of 150 pounds to the square inch can be secured by its use, though for all practical purposes a 60-pound pressure is sufficient. An ordinary pressure gauge indicates the force. From the tank an iron pipe carries the gas to a series of jets which throw the flame to a distance of six feet and more. The flame is covered by a hood which retains all the heat on the surface of the ground, and can be extended indefinitely, as occasion may demand. The consumption of gasoline is 1¼ gallons per hour, one charge being calculated to last ten hours, during which time it will thaw 25 cubic yards of dirt. It now requires a cord of wood to thaw a yard of gravel, and as wood at Dawson City is \$40 a cord, the cost of 25 yards is \$1,000.

## Foreign Construction of Battleships.

The appropriations made by European nations for the strengthening and enlarging of their naval forces and equipment are in evidence of the great contest now begun for sea-supremacy. It has come to be a craze and a scarlet tinged fad at that. Germany has its dreams and Russia its visions, and Great Britain with a grim resolve to hold on to the trident of Neptune is showing almost a fierce energy in naval enterprise. The present year will see three new battle ships, four armored cruisers, and four sloops to be put on the stocks during the current year. Including these there are under construction twelve battle ships, sixteen first-class cruisers, six second-class cruisers, ten third-class cruisers, four gunboats and forty-one torpedo boat destroyers. The crews of ships already in service number 100,150. With the fact staring all naval experts in the face that science is continually inventing new methods of destruction that may practically render the stoutest of modern ships an easy prey to some new device—European money is being spilled like water in the construction and equipment of vessels the end of which may be an enormous addition to the scrap pile of old Neptune.—*Age of Steel*.

A bill has been introduced into the Hawaiian legislature authorizing the construction of a cable between the United States and Honolulu, by the Pacific Cable Company. This bill gives the company exclusive cable rights for 20 years. The cable must be laid within eighteen months after the passage of a concurring act by the American congress, and extended to Japan within three years. It must be capable of transmitting fifteen words per minute. This company has obtained a favorable report from a congressional committee at Washington on a bill to enable it to lay the cable.

## Hanna's Amendment to the Patent Laws.

The following important amendment to the patent laws was recently introduced in the United States Senate by Senator Hanna:

"That in cases of infringement or alleged infringement by purchasers or users of any patented device whatever, any individual, company, or corporation, to establish their claims upon patents of said devices, shall in the courts having jurisdiction, enter suit against said purchaser or user within the space of five years from the date of the first alleged infringement by said purchaser or users or be forever debarred from collecting royalty or damage for the use of said device, to the end that the purchaser shall become the owner in reality as well as in name and not be further molested.

"That any individual, company or corporation owning or controlling patents acquired by purchase or otherwise, in case of alleged infringement by any inventor or manufacturer of any device whatever, to establish their claim of infringement on such device shall, in the courts having jurisdiction, enter suit within the space of one year from the date of said infringement, or be forever debarred from collecting damage from said inventor or manufacturer, though this act shall not be so construed as to debar any individual, company or corporation from establishing their ownership to patents upon said device thus manufactured.

"That any laws conflicting with the above conditions are hereby repealed and declared null and void, and this act shall become a law on and after its passage."

The reasons offered for the presentation of this bill are that there exists at present an abuse of the rights and privileges granted to owners of patents, which has become widespread and is causing great inconvenience and unnecessary expense to innocent purchasers of devices upon which two or more individuals, companies, or corporations claim patents. These claims are said to be often made through the use of telegrams, circulars, pamphlets, letters and advertisements, threatening and intimidating purchasers of such devices, the intimidation sometimes extending over months and years. In a majority of cases it is contended that the cost of defence of the purchaser's rights would be far in excess of amounts claimed, and in these cases settlements are forced to be made before claims have been thoroughly established. It is therefore contended that such a bill will give ample time to recognize the rights of inventors and yet protect purchasers from great inconvenience and loss, such as is frequently sustained under the present system.

## Wireless Telegraphy.

The application of the system of telegraphing without direct wires, which has been engaging so much attention lately, has just been successfully carried out in establishing telegraphic communication for the War Office between Lavernock Fort and the fort on the Flat Holm (in the Bristol Channel), a distance of 3¾ miles. On the mainland opposite the island, an ordinary pole line, three-quarters of a mile long, with a heavy copper wire, has been erected; the ends of the circuit terminate in the sea. On the island there is a similar line established, about half-a-mile long. The transmitting apparatus (on each line) consists of a contact breaker, worked by a small dynamo running at 3,000 revolutions per minute, and giving 250 makes and breaks per second, corresponding to the middle C note; the intermittent current is given by ten Obuch dry cells. An ordinary Morse key interrupts the circuit, and the receiving apparatus is an ordinary telephone receiver. This system is peculiarly applicable to this particular case, for it has been found impracticable to maintain communication between the two forts by means of a cable; the latter was repeatedly broken by the anchors of the shipping.—*Trade Journal's Review*.

It has been proved to the satisfaction of the investigators at least, according to recent discoveries in Egypt, that the wonderful people of the Nile actually printed from movable types as early as the ninth century A. D. Two papyri of that time have been found, and 27 printings on paper of the century following. Indications point to all the printing having been done by priests, and the perfection of it indicates that it was no new experiment with the clever craftsmen. It has been learned that printed paper money was issued in northern Syria during the second crusade, and that as early as 794 the government of the Caliph of Bagdad owned and operated a paper factory.



## HAMMOND vs. HART.

**Important Interference Decision by Commissioner of Patents Duell—Interferences Involving Rejected Claims and Claims to Inventions Differing in Scope, Condemned.**

In a recent decision in an interference case (Hammond vs. Hart, 83 O. G. 743) Commissioner of Patents Duell, took occasion to discuss the existing interference practice in the Patent Office, in respect to including under the issues of interferences, claims which have not been found allowable and also the practice in respect to the declaration of interferences between applications whose claims are not coextensive in scope.

That part of the decision which has a general bearing upon the practice is fully outlined below.

The case came before Mr. Duell upon appeal from the decision of the primary examiner denying Hart's motion for the dissolution of the interference.

## THE POINTS OF APPEAL.

The following were the points of appeal: first, no interference in fact; second, no interfering claims; third, non-patentability of the claims of Hammond involved in the interference, and, fourth, irregularity in the declaration, preventing proper determination of the question of priority.

The third point was not in this case considered.

The first and second points were summed up in the one question, do the claims of the parties interfere?

The fourth point was first separately considered.

## THE FACTS.

Hart's claims were rejected by the primary examiner and appealed to the examiners-in-chief, where the action of the examiner was affirmed, but with certain recommendations, under which Hart's application was amended, new claims being inserted, which were allowed by the examiner. At this point Hammond was directed by the examiner to place his application in condition for a probable interference. Thereafter his application was amended, which resulted in an allowance of two claims and the rejection of nine claims. At this point the primary examiner declared the interference under two counts. Certain of Hart's claims were declared to be involved in the interference. Neither of the claims allowed to Hammond was placed in the interference, which was declared as embracing Hammond's rejected claims.

Hammond after the declaration of the interference moved, under Rule 109, for leave to file an amendment consisting of two claims, which are the issues of the interference. The motion was transmitted to the primary examiner, but was not passed upon by him. Apparently as the interference was not redeclared, as required by the rule—the amendment was not admitted.

## INTERPRETATION OF RULES 93, 94, 95 AND 96.

Mr. Duell first discussed Rules 93, and 94, in connection with the examiner's action and found that these rules contain no warrant for putting into the interference claims which had not been allowed and which in the examiner's opinion, were not allowable.

Rule 95, Mr. Duell stated, clearly forbids such practice because it expressly provides that before the declaration of the interference, the claims of the respective parties must be put into such condition that they will not require alteration after the interference shall have been finally decided unless the testimony addressed upon the trial shall necessitate or justify such change. Rule 96, which provides for the declaration of an interference in case a party, after due warning, has failed to get his application into proper condition for interference, does not conflict with Rule 95, since Rule 96 means simply that when the formal requirements of an application such, for example, as the requirement for a new drawing; or oath, or for further action, upon rejected claims which are not involved in the interference, or for analogous changes—have not been complied with the interference shall be declared, so that the party whose application is in proper form shall not be unnecessarily delayed in the further prosecution of his application. The rule does not mean that the examiner declaring the interference can ignore the requirement that the *claims* of the party in fault must be put in such condition that they will not require alteration, etc. If Rule 96 means that, then Rule 95 means nothing. The two rules should be construed in connection with Rules 93 and 94, so as to give vitality to all.

Under the above interpretation there is no conflict between the rules, and in declaring interferences this interpretation of the rules should be followed. No justification exists for the declaration of an interference between the *allowed claims* of one application and the *rejected claims* of another

application. Two applications do not interfere in such a case.

## AN IRREGULARITY.

Applying to the facts in this case the natural and obvious construction to be placed upon the rules, it becomes apparent that there was an irregularity in the declaration of the interference which prevents a proper determination of the question of priority, for the reason that Hammond's application contains no *allowed* claims said to be embraced within the issues, and therefore he is not claiming in whole or in part the same invention as is Hart.

## INFRINGEMENT CLAIMS AND INTERFERING CLAIMS.

Mr. Duell then proceeded to pass upon some other points constantly arising in interference proceedings. He remarked that there is a great lack of uniformity in the office relative to the question whether applications or applications and patents interfere, in view of which a review of the rulings of the courts and conflicting Patent Office decisions might not be amiss at this time.

That mere infringing claims, he says, are not interfering claims is evident throughout the whole list of decisions of the courts, and the courts have uniformly decided that under the statutes applicable to interferences two patents do not interfere within the meaning thereof when they do not claim in whole or in part the same invention. The decisions of the office unfortunately have not been uniform in deciding the question whether or not two applications interfere within the meaning of the statutes and rules of the office applicable to this subject.

## COURT DECISIONS.

He discussed a number of decisions of the courts—Gold and Silver Ore Separating Co. v. U. S. Disintegrating Ore Co. (3 Fish., 489); Nathan Co. v. Craig. (58 O. G., 1093); Stonemetz Printer's Machinery Co., Brown Folding Machine Co., (64 O. G., 1135); and Dederick v. Fox, (63 O. G., 1963); and concluded his discussion of court decisions with the following:—

"Reference might be made to many other cases; but the rulings of the courts that unless claims are of the same tenor and scope they do not interfere and that dominating and dominated claims cannot interfere have been so uniform that it seems useless to multiply authorities. So far as the courts are concerned it appears that the only question which they consider in determining whether an interference in fact exists between claims is whether the claims interfere and that in considering this question it is unnecessary to determine the question of patentable novelty or the question whether the claims are patentably different."

## COMMISSIONER'S DECISIONS.

The discussion of the decisions of various commissioners is then taken up, beginning with Drawbaugh v. Blake, (23 O. G. 1221); which was the first upon this subject to be made after the first appearance of present Rule 93, on January 1st, 1880. In substance this case holds that the question is whether the claims of the parties cover substantially the same invention; that formal and non-essential differences should be disregarded; that a broad or generic claim and a limited or specific claim do not interfere, and that it does not conflict with public interest to send a broad or generic claim to issue after a narrow or specific claim has been patented. Mr. Duell finds this case well reasoned and founded on the statute (section 4904) and the rules of practice applicable thereto.

Just a year later the decision was practically reversed by *ex parte* Upton, (27 O. G., 99,) which holds, among other things, that if the claim of one party will include that of the other there is an interference in fact. This finding Mr. Duell says, is unsupported by any cited authority and is clearly opposed to the decisions heretofore cited and to those cited in Drawbaugh v. Blake.

The Upton case also finds that it should be settled in the Patent Office who is entitled to the broad claim, and this should appear as the result of an interference proceeding. It is not however, the province of the Patent Office to settle who is entitled to any claim, broad or narrow, unless an applicant first makes the claim. It is the well-settled rule of practice in *ex parte* proceedings that where an applicant fails to make a claim as broad as he is entitled to, his application is sent to patent. It appears in the Upton case that the patentee, Dodge, had but one very limited claim to the construction shown and described, while the applicant, Upton, made broad claims to the genus. The rules in force when the Upton case was decided contained one similar to present Rule 75, and it seems that the patent to Dodge, being a proper reference to the broad claim of the Upton application, under the rules, Upton, if he claimed to have made the invention before the date of the application for the Dodge patent and having made the necessary affidavit overcoming the patent as a reference, should have had his application passed to issue and should

not have been placed in interference with the Dodge patent. Such Mr. Duell believing to be the proper practice, and recommends that it be followed.

## GENERIC AND SPECIFIC CLAIMS—THE SPIRIT OF THE LAW.

Concerning a statement in the Upton decision that the spirit of the law does not sanction the granting of patents with specific claims while applications with generic claims, including the specific claims are still pending, Mr. Duell says that the spirit of the law can be determined only by its language and by the decisions of the courts construing this language, and implies that according to the proper construction of court decisions previously alluded to, the spirit of the law does not sanction the declaration of interferences unless the opponents have interfering claims of the same tenor and scope.

## GENERIC AND SPECIFIC CLAIMS—PUBLIC POLICY.

Concerning the statement in the Upton decision that the allowance of specific claims, while dominating generic claims are pending is against public policy, Mr. Duell points out that the Upton decision does not state what public policy is violated and implies that the decision in question is itself against public policy since it is against the law, and to obey the law is public policy.

## IMPROPER EXTENSION OF MONOPOLY.

The third reason adduced in support of the conclusion in the Upton case, is that the action "improperly extends the monopoly." He does not think this reason well founded. It cannot be presumed, he says, that a patentee who has gone out with a narrow claim made the broad invention. The presumption is that he claimed all that he invented. Another applicant, having made a broad claim, is entitled to his patent. If a patent with a narrow claim has meanwhile issued, the applicant with the broad claim, having given sufficient proof that he made the broad invention before the application for the patent for the narrow invention was filed, is entitled to his patent. The two patents being issued, the long line of reported cases proves conclusively that the courts would undoubtedly hold that the two patents were not interfering patents. If the patentee holding the first patent containing the narrow claim proved that he was the first inventor of the subject-matter of the broad claim contained in the second patent, such claim of the second patent would, in proper proceedings in the courts, be held to be void and invalid. Again, a monopoly is extended only when two patents claim the same thing in the same breadth. In order to extend the monopoly, two co-existent patents must each have the same claims. The two patents must be co-extensive in the number of the elements and in the breadth of each element. The reasons stated for requiring an interference between two applications differing in the breadth of the claims are of no force, for the reason that whether the two co-existing patents are obtained as the result of or without an interference proceeding there is no extension of any monopoly. The question whether an extension of a monopoly will result from the institution of or failure to institute an interference proceeding in the Patent Office cannot properly be considered. It is not the province of the Patent Office to make law. The law as it stands should be obeyed, and such wrongs, as result from the law should be corrected by legislation, not by forced judicial construction. So far as the Upton case holds that an interference should be declared between two applications or between an application and a prior patent whose claims are not substantially identical in tenor and scope it is not well founded in law.

## CHANGE IN PRACTICE.

The decision in the Upton case seems to have been in the main followed until the decision in the case of Reed v. Landman, (55 O. G., 1275.) This case overruled *ex parte* Upton in its holding that when one claim included another there is an interference. It practically revived and affirmed the decision in Drawbaugh v. Blake, *supra*. In one respect, however, it made an exception to the decision in the earlier case in that it held that an interference should be declared between a generic or broad claim and a specific or narrow claim when both claims are drawn on the same structure.

The exception made by the then commissioner does not seem to be well founded since either claim would sustain a separate patent, and the existence of both patents would not extend the monopoly of either claim.

Dr. Duell finds that this exception is erroneous, and its application to any given case hereafter to be avoided.

## EXAMINER MAY SUGGEST BROAD CLAIMS.

He intimates that in case two applications having claims of different scope drawn on the same structure, the examiner should give the applicant making the specific claim an opportunity by suggestion,



to make the broader claim, and if he makes such claim an interference will properly follow.

#### DECISIONS REVIEWED.

He then reviewed a number of Commissioner's decisions *ex parte* Weeden, (60 O. G., 1191); Edison Stanley, Jr., (27 O. G., 273); Zeiting v. Reynolds; (57 O. G., 1279); Searley v. Frumveller; (58, O. G. 804.) Dodd, v. Reading, (58 O. G. 1413); and Kinyon v. Carter (66 O. G., 513).

#### INTERFERRING PATENTS AND INTERFERRING APPLICATIONS.

In discussing the holding in the last, Kinyon v. Carter, to the effect that the rule in Reed v. Landman does not apply when both parties are applicants, and that an interference exists between specific forms one of which is covered by a claim broad enough to dominate the specific claim of the other, he concludes that the rule to be applied in an interference between two applications is not different from that to be applied in an interference between an application and a patent. In both cases an interference does not and cannot legally exist unless the claims are co-extensive. The courts have clearly held that the interference proceeding intended and carried on under former section 16 of the act of 1836, now section 4918 of the Revised Statutes, is the same as the proceeding contemplated in section 8 of the same act, now section 4904 of the Revised Statutes. (Gold and Silver Ore Separating Co. v. U. S. Disintegrating Ore Co., *supra*.) The difference between the two simply rests in the fact that the forum is different. The examiner or commissioner treating the question of interference should, in deciding whether or not an interference should be declared, treat the applications or the patent and the application the same as though they were both issued patents pending before the court.

The same principles which determine whether there would be an actual interference must apply alike in each of the conditions in which the cases are when before the Patent Office to determine whether they would interfere.

#### CONCLUSION.

He concludes his observations with the following: "Reviewing the uniform decisions of the courts and the conflicting decisions of the Patent Office, giving due weight to the reasons adduced for arriving at the various conclusions, and noting the authorities sustaining the various conclusions, whenever authorities have been cited, I am of the opinion that an interference can only be instituted for the purpose of determining the question of priority of invention between two or more parties claiming substantially the same patentable invention; that of necessity there must be allowed claims to all parties before an interference can be declared, and that not only a patent and an application must claim in whole or in part the same invention, but also two applications must claim in whole or in part the same invention before an interference can be declared."

It is thought among patent officials and practitioners that the decision in question will result in a very considerable reduction in the number of interferences declared, and in the work attendant thereupon. It will probably have as one immediate consequence a marked increase in the number of motions for dissolution of interferences upon the ground of no interference in fact, though it is thought that eventually the proportion as well as the number of such motions will be diminished. This decision is the most important and most radical interference decision since Reed v. Landman, if not, since *ex parte* Upton.

#### Books and Magazines.

One of the latest and most valuable little publications out, by Laird & Lee, Chicago, is the Pocket Manual for Machinists, and Engineers, edited by D. B. Dixon. It includes a compilation of rules and solved problems pertaining to steam engines, steam boilers, steam pumps, etc., based on plain arithmetic, and free from algebraic difficulties, together with necessary tables, and data of highly practical value in the machine shop, mechanical drawing room and steam power plant. It embraces a dictionary of terms used in steam engineering and electricity; the construction and operation of dynamos and motors, artificial refrigeration and ice making; treatise on the steam engine indicator, gearing, shafting, lathe screw cutting, etc., etc. This illustrated volume of 371 pages, printed on excellent paper and bound in leather, in pocket form. Leather, with rubber band and pocket: \$1.00.

The only American book treating exhaustively the subject of gas, gasoline, and oil engines, was published by Norman W. Henley & Co., New York, the author being Mr. Gardner D. Hiscox. A second edition, revised and enlarged has just been issued by the same publishers and sells at \$2.50. The book treats of the theory and practice of gas, gasoline, and oil engines, as designed and manufactured in the United States. It also contains chapters on

horseless vehicles, electric-lighting, marine propulsion, etc. There are 384 pages and 270 engravings. The work is a valuable contribution to the library of the mechanic and engineer. The book also contains a list of all patents issued in the United States for gas, gasoline, and oil engines and their appliances from 1857 to 1897 inclusive.

#### Interesting Facts About Spain.

Spain, proper, has 196,173 square miles of territory; 17,550,216 of population, and \$492,860,770 of national debt. The constitution under which she is now governed bears the date of June 30, 1876. The present reigning family are Bourbons—descendants of Louis XIV, of France. Maria Christina, the Queen Regent, was an Austrian Princess; the King, her son, Alfonso XIII, was born May 17, 1886—nearly six months after the death of his father, Alfonso XII. His two sisters, Infanta Maria de las Mercedes and Infanta Maria Theresa are eighteen and sixteen, respectively. Spain's legislature is the Cortes—composed of two houses—a senate and a chamber of deputies. The senate is partly hereditary, partly for life and partly elective—the elective senators being chosen for terms of five years by the most highly-taxed subjects; and the chamber of deputies is elective—its members being chosen for terms of five years by tax-paying subjects, at least, twenty-five years of age. Each 50,000 inhabitants is entitled to one deputy. The State religion of Spain is Roman Catholic, which is maintained by the government; but the constitution permits non-Catholics to exercise their worship, but they must do so in private and without making any public announcement of their services. Spain's public expenditures, in 1897, were \$200,680,411; and her public revenues were only \$132,945,608. The King has a civil list of \$1,400,000, besides \$600,000 for the royal family. Madrid, her capital, has a population of 579,602. About thirty per cent of her population can both read and write, while about fifty per cent can neither read nor write. Spain's colonies are Cuba, Porto Rico, Ceuta (Morocco), Fernando Po, Annabom, the Philippine Islands, the Mariana Islands and the Carolines; her total available war strength is 1,279,642 men; her army is equipped with the Mauser rifle of .276 calibre; her government has exceeded her conscription-list for two years past, and her troops for Cuba are recruited by special drafts. Her land forces are: 56,949 infantry, 12,480 cavalry, 9,812 artillery, 3,921 engineers, 9,318 East Indian troops, and 245,000 Cuban and West Indian troops. Her navy, excluding accessions this year, comprises 11 armored ships, 63 unarmored ships, 2 armored gunboats, 40 unarmored gunboats, 2 despatch vessels, 79 torpedo boats, 10 transports, 1,780 officers, and 15,600 seamen; and her naval fighting service comprises 400 officers and 9,680 marines, in addition, besides 25,000 naval reserves.

Spain was at the zenith of her power and glory under Emperor Charles V, when she practically ruled the whole of Europe and America; but she is at its nadir now. She has a powerful hereditary nobility—the highest being the grandee. Her monetary unit is the peseta—worth about 19 cents in our money; her national colors are red and yellow; her people are conceded to be the most courtly race in the world, and the most beautiful women in the world are said to be found in Cadiz. Cervantes was her greatest author and France is her greatest creditor. She has many anarchists, but few socialists, and her emigration to the United States has always been very small: from 1840 to 1850 it was 2,759; 1851 to 1860, 10,353; 1861 to 1870, 9,047; 1871 to 1880, 9,767; and 1881 to 1890, 5,564.

Alfonso XIII's mother has been the regent during his minority, and although an Austrian by birth she has commanded the loyal support of her Spanish subjects. If she had been Queen in her own right she could not have exercised greater power and influence.

The education of her son has been her chief care, and she has directed it with homely common sense and maternal affection. She has also faced all the responsibilities of government with courage and firmness. She is a good Queen and a wise woman, and her great ambition is to preserve the monarchy for her son.—*Friend at Court*.

THERE are but few electric roads in England and the reason possibly comes from the excellence of England's public roads. Besides it is not a country of such "magnificent distances" as the United States. In the utilization of electricity the United States excels, generally, its use as a motive power for horseless carriages being one of the notable exceptions.

The Illinois Steel Company expects to break the record this year in all its branches. To do this will require the handling of nearly 3,000,000 tons of ore.

#### Governmental Demoralization of Patent Solicitors.

It is not necessary for us to say a word as to our appreciation of the United States patent laws, or of our unwavering conviction that they have been a most powerful stimulant and promoter of our national industries. We believe that the good work of the patent office is by no means all done, and therefore it is that we would have it as free as possible from reproach. We respect also the patent agent as a necessary co-operator to the success of the patent system. There is no more honorable occupation if legitimately followed, and the faithful and upright practitioner is not too well paid at the best.

It is, however, a fact which will not be disputed, that there are so-called patent solicitors who perform no useful function, but are prolific only of evil, who bring reproach upon the profession, and whose extirpation would be a blessing to the community. As these columns have pointed out before, these creatures are the product of opportunity. Some of these malignant opportunities it is perhaps impossible to eliminate, while there are others whose active existence should cause constant astonishment. Human nature is what it is. The typical and too common type of inventor is sanguine and credulous, and usually grossly uninformed as to patent practice and routine. Many have an unwarrantable faith in the value of a patent merely as such, and are quite regardless of what it may cover or whether it covers anything, as in too many cases it practically does not. The wily "patent solicitor," as far as we can see, must continue to solicit such as these, and suck their blood and wax fat.

He should not, however, have the connivance and practical assistance in his nefarious calling of the organized force of the patent office. The patent laws are for the purpose of securing temporarily to the inventor his property in any useful invention, so that he may be encouraged and rewarded, and so that in the end the entire community may reap the benefit. The patent office professes to deal only with useful inventions, and those which are not useful and which are of no value it has no proper business to protect. The question of utility is found in practice to be one not easy of determination. It is therefore interpreted "liberally," and liberality, here as elsewhere in the interpretation of the laws, is not synonymous with exact justice.

This, however, is not the point to which at present we wish to call attention. The question of utility may always be a debatable one. A thing that is useless today may be of great use in the further developed practice of tomorrow. But a thing to be patented should at least do, or be able to do, what it claims and is represented to do. There is something wrong when patents are allowed to issue for devices which actually will not work. Such patents are sometimes issued, the patentee is victimized, the patent solicitor receives his unjust reward, and why is it not with the connivance and assistance of the patent examiner? We have not far to look for an illustration. Within the present year a patent was issued for a so-called "roller skate." It was not properly a roller skate, as a large ball took the place of each bearing roller, but we are not picking a quarrel upon that point. But there was provided a circular cavity down through which the large ball partially protruded and above it were two other balls, separated laterally from each other, and both touching the large ball below and the interior of the circular cavity above, with a third ball between these two touching each and also touching the same inner circular surface. These balls were all in the same vertical plane, the central plane of the skate.

The impossibility of the balls rolling continuously or of performing the anti-friction function claimed for them is evident. Yet this is a patent issued by the United States patent office for a *useful* invention. After seventeen years all the people will be at liberty to use it without asking the inventor's leave. If patents such as this are procurable there will always be patent attorneys who will undertake the task of working them through the office. It would be interesting to get some insight into the mysterious system which permits the issue of such an extraordinary patent as this, which unfortunately is far from being the only one which has issued for a self-evident impossibility. It is no wonder that the "no patent no pay" attorneys flourish. The chances seem to favor their success. The fact that the United States government will issue a patent on such a thing as this results in but one thing. It enables the patent solicitor and the government aforesaid both to get money from a man, and for the money to give absolutely nothing of value in return.—*American Machinist*.

Sufferers from neuralgia are warned by a medical writer not to drink tea, but coffee in which the juice of a lemon has been squeezed.



### Will the Government Heed the Lesson?

A telegram from Liverpool, April 16th, says: "The White Star line steamer *Bovic*, which sailed for New York last night, had on board a large consignment of Lee-Metford rifles, two Maxim Guns, fifty Krupp quick-firing guns, and twenty tons of Ammunition."

As all know, we are spending millions abroad for vessels, arms and ammunition, which we could and ought to have made at home, of even better quality, and thus have given employment to our own people, and kept those millions in our own country, to say nothing of the national humiliation of our being caught in the present emergency in such an unprepared condition.

So far as the navy is concerned this is owing to the failure of congress to make the necessary appropriations; but as to arms the failure has resulted from the refusal of the department officials to adopt the improvements offered by our own people.

This very Lee-gun which we are now importing from England was invented here, and patented at home and abroad in 1878, and was officially tested by the board of equipment, by special order of the secretary of war in 1879, in this city.

The board spoke of it in high terms, and concluded their report in these words:

"The comparative simplicity of the mechanism, and the ease with which the magazine can be applied make it a valuable and destructive weapon. The trials made in the presence of the board were most satisfactory."

Instead of adopting it, the government continued the manufacture of the single loader army gun. But not so with European governments. It was soon adopted by Germany, Austria, and Great Britain, each making some slight alteration, and giving it a new name—the Manlicher, the Mauser, and the Lee-Metford. It has since been adopted by nearly all the smaller governments of Europe and South America, either the Manlicher or the Mauser. The Spanish troops in Cuba are reported as being armed with it.

Our own government waited until after it had been adopted abroad—so late indeed that as reported, but 75,000 have been made up to the present time; and even then, it adopted a modified form of it known as the Kraag-Georgensen, the patent for which is owned abroad, so that the royalty paid goes to foreigners! The navy, however, adopted the Lee, but also adopted a different caliber, so that the same cartridges cannot be used in the army and navy guns, which would seem to be a very impolitic thing to do, as often one may be out of ammunition while there is plenty of the other at hand, but cannot be used—the two forces frequently being required to co-operate, as they would be very likely to in Cuba, or at distant points, when a fresh supply for either could not be readily obtained.

It was the same with the Maxim guns. Maxim is an American. He invented and patented his gun here, and tried to induce the government to adopt it, but failing to receive any encouragement, he went abroad, and receiving encouragement, established his factory in Europe, where he employs constantly not less than 400 men.

It was the same during our late war and for years afterwards. As early as 1862 one of our own citizens, Mr. W. C. Dodge, advocated the adoption of the reduced caliber, now used by nearly every government, our own included; and to demonstrate its superiority, he sent a gun from this city to the Sharps factory and arranged with the president of that company to replace the barrel with one having a small caliber; but before they could get around to it, the Sioux Massacre broke out in Minnesota, whereupon he telegraphed the company to send the gun with 500 cartridges to his friend, Governor Austin, who used it during the campaign which resulted in the capture of Little Crow and several hundred of his followers. The gun is now in Mr. Dodge's collection in the National Museum in this city.

In 1863 he tried to induce the government to adopt breech loading and magazine guns and metallic cart-

ridges, and published a pamphlet entitled "Breech Loaders vs. Muzzle Loaders," which in view of subsequent events furnishes some curious reading. So strong were the arguments furnished by him, that in 1864 the Winchester Repeating Arms Company, with his permission, published a third edition of 10,000 copies for general distribution. It was not however until 1872 that the government finally adopted the single breech loader known as the Springfield gun.

In 1863, Mr. Dodge invented and in 1865 patented the revolver extractor, and the identical style of revolver now used both by our army and navy; and which he tried to induce the government to adopt then, but in vain.

Continuing his efforts, in 1866, at the request of the then chief of ordnance—General Dyer—he took an old style army revolver, and changed it at a cost of \$75, to the present style of army revolver—General Dyer saying that the government had a large number of the old style on hand which they could not afford to throw away, and which might be thus improved. Mr. Dodge argued that he could devise a new arm that could be made nearly as cheap as the old ones could be altered, and that would be much better, and that the old ones could be sold to Central or South American governments; but in vain. Nothing was done for years, and not until after his patent had expired. He was never even paid for the alteration he made at the request of the department, and that arm is now with his collection in the National Museum.

At the time of the trial of the Lee-gun in 1879, Mr. Dodge also submitted a revolver which he had devised, by which 9 buck-shot were fired from each chamber, thus having nine missiles instead of one at each discharge, thus multiplying the chances of hitting the enemy nine fold. This was also commended by the board in its official report.

In a letter published by General Miles about that time, he said the ordinary revolver in the hands of mounted men was of but little account, for the reason, that as the horse was galloping or trotting there could be no certainty in the aim; and that if they could be armed with a weapon that would shoot buck-shot, it would be far more effective; but the department never adopted it.

But probably the greatest service he rendered the government was by the invention of his Cartridge Loading Machine in 1864, and which he patented in 1865.

Up to that time cartridges, the world over, had been filled by dipping the powder up in a copper cup holding the quantity required for a charge, and pouring it through a copper funnel inserted in the mouth of the paper case.

This was a very dangerous and unsatisfactory plan—dangerous because a whole keg of powder was exposed in a long box or trough, on opposite sides of which the operatives sat—and unsatisfactory because it was impossible to fill each cartridge with the same weight of powder; and any variation in the weight of powder, effected the accuracy of the shooting—the ball flying high, if too much, and low, if too little.

On the 17th of June 1864, at the arsenal in this city, where 108 girls were at work filling cartridges, some fire works for celebrating the 4th of July were being made. They were laid on sheet iron out in the sun to dry; and it being a very hot day some of them exploded—went through the open windows of the laboratory, set fire to the powder and blew up the whole concern.

As stated in the *Star*, "nineteen dead bodies were taken out so terribly charred as to be almost wholly beyond identification. Three more were mortally wounded, and fifteen or twenty more severely injured."

Similar, though less fatal, explosions had occurred in other cities in the United States where the work was being done by contract for the government; while even worse explosions occurred abroad. In Italy nearly 100 were thus killed—in France at Metz sixty; and at Chausay eighteen were killed and forty wounded. At Birmingham, England,

twenty-one were killed, forty wounded, thirty fatally; and at Greenwich a large number were killed and wounded; and at Agra, India thirty were killed, and all the rest, including several officers were wounded. Many other explosions subsequently occurred—at Paris, at Santiago, Chile, and elsewhere.

Mr. Dodge conceived the idea of a machine to do this work, by which the powder should not be exposed—the cartridges be filled with greater uniformity—far more rapidly and at less expense.

Upon laying his plan before Col. Benton, then in charge, and other officers, they discouraged him by saying, that as the grains of powder were not uniform in shape or size, they did not believe it would be possible to so measure it by a machine as to secure uniformity of charge, which they considered more important even than the proposed saving of life and labor.

Mr. Dodge, however, had faith in his ability to do it, and he had a small machine made to fill a dozen at a time, and submitted it for trial. The result was so satisfactory that the department at once gave him an order for a full sized machine to fill 100 cartridges at a time, and to fill both kinds, for muzzle-loaders and for breech-loaders.

Finding it impossible to get it made here, with the degree of accuracy required, after much trouble he succeeded in having it done in New England, though at a much greater expense of both time and money than he anticipated.

It was delivered, and officially tested under the supervision of Col. Benton and the foreman, with even better results than before.

It was so constructed that it could be adjusted to fill all the different sizes of cartridges required for the various arms, rifles, carbines, revolvers, etc. A single movement of a lever filled 100, and as stated in the official report "it was worked at the rate of six times per minute," thus filling 360,000 per day of ten hours, whereas, by hand the average by experts, was but 10,000.

As stated by Col. Benton in his official report, "one such machine would do the work of many hands," and he further said, "it was worked constantly for half a day by the foreman of the laboratory with results as uniform as those given above, (referring to a tabular statement showing the weight of powder in the several shells filled) and I see no reason why it should not continue to do so," and that "it appears to be as well adapted for filling metallic shells as the Sharps," which were of linen cloth.

It was not until 1868, that the government adopted the metallic cartridge. They had made some in 1864, but they proved defective, because as made, the fulminate which was put in wet, acted upon the metal shell inside, so they would not fire, and the grease used for lubricant on the exterior, when the cartridges were stored for any considerable time, decomposed and formed a powerful acid which destroyed both the shell and the bullet.

On being shown some of these ruined cartridges by General Dyer, Mr. Dodge set to work to devise a remedy, which he patented in 1864; and subsequently when the government began their manufacture, they used this invention for three years, and until they adopted the outside primer, which had been brought out by private manufacturers in the meantime.

It is a remarkable fact, that although Mr. Dodge was decorated by the King of Spain, and presented a gold medal by the King of Italy years ago, for this invention and that of the revolver, he has never been paid a cent to this day by his own government, either for the machine furnished or for the revolver, or anything else he did for the benefit of the government.

A bill to pay for his loading machine has four times passed the senate, and been seven times favorably reported in the house, but never reached a vote.

It was because of his special knowledge of the subject, that Mr. Dodge was appointed one of the judges of Munitions of War at the Columbian



World's Fair, he being the only American appointed on the committee.

The above statements show how slow our government has been to avail itself of the improvements offered by its own citizens, and the discouragements with which inventors who seek to benefit the government have been met.

European governments act very differently. They are on the lookout for any and everything that will strengthen their armies or navies, whether of home or foreign origin.

The British government has adopted successively three different American guns for its army, and has paid liberally for the patent in each case. The first was the Schneider-Enfield gun, by which the Enfield muzzle loader was converted to a breech-loader. The second was the so-called Martin-Henry, which was the Peabody gun simply changed from rim-fire to center-fire, and last the Lee-Metford, which is the Lee-gun with some slight alteration of the breech bolt suggested by Col. Metford, and hence the addition of his name.

Germany, Switzerland, Austria and the other European governments simply appropriate our inventions, make some slight alteration, give them a German, Swiss, or Austrian name, and never recognize the inventor at all, as was the case with the Manlicher and the Mauser.

It remains to be seen whether the present condition of affairs will result in a change of action on the part of our government. Certainly, it would seem to be the part of wisdom for this nation of 70,000,000 people, and who, as Mulhall says, possess more of the world's wealth than any other nation in the world, to provide itself with those means which are absolutely necessary to protect itself, and vindicate its honor and standing among the nations of the earth. It should at least treat its own citizens who devote their time, efforts and means to bring about this result, with common honesty, and which we regret to say, has not always been the case.

#### The Report on the "Maine."

A subscriber wants to know just what the actual findings of the Marine Court of Inquiry in the Maine case were. Here they are in concise form:

First—The court finds that at the time of the explosion, the battleship Maine was lying in five and one-half to six fathoms of water.

Second—The discipline aboard the ship was excellent; everything stowed according to orders—ammunition, guns, stores, etc. The temperature of the magazines at 8 p. m. was normal, except in the after 10-inch magazine, and that did not explode.

Third—The explosion occurred at 9:40 o'clock on the evening of February 15. There were two explosions, with a very short interval between them; the ship lifted on the first explosion.

Fourth—The court can form no definite opinion of the condition of the wreck from the diver's evidence.

Fifth—Technical details of wreckage from which court deduces that a mine was exploded under the ship on the port side.

Sixth—The explosion was due to no fault of those on board.

Seventh—Opinion of the court stating that the explosion of the mine caused the explosion of two magazines.

Eighth—The court declares that it cannot find evidence to fix responsibility.

#### Hot Water Slot Machines.

Boiling water from street lamps, says a contemporary, is the latest scheme to which the slot system has been applied. The machine takes the form of a handsome street lamp, with a large base, which contains a cistern holding forty gallons of water. Cold water is fed into a spiral coil and pre-heating chamber above the jet, and there converted into steam by the heat. The steam is then impelled by its own expansive force down the base, where it heats the water in the cistern by circulation through an iron coil, so that the steam does not actually come into contact with the water to be supplied to the public. The directors of the company claim that not only could they utilize the waste heat of the lamps in London, but that at 1 cent a gallon they could pay for the gas and for the water used, and then leave a large margin for profit.

#### Electrical War Inventions.

From all accounts the war excitement has caused a flood of applications for various electrical devices to pour into the Patent Office in Washington. Examiner Seely, chief of the electrical division of the Patent Office, is credited with having devised an electrical dynamite gun for throwing a large number of projectiles in an exceedingly short space of time. The weapon consists of a tube made up of a series of coils of wire—a solenoid in short—which is fed with the explosive shells from a hopper. Along the tube there runs a copper channel, and wires are so arranged as to connect the two ends of the gun with a suitable electric battery. The spherical projectile, as it runs through the tube, closes the circuit at a number of points, its velocity being gradually augmented until it is finally projected from the mouth of the gun with sufficient force, so it is claimed, to throw it a distance of six miles. There are several important advantages claimed for a gun of the above description. It could, in the first place, from behind an embankment, pour a steady stream of bursting projectiles upon a ship at sea without in any way informing the enemy of its location, owing to the absence of both smoke and noise. As the shell being thrown receives no shock, the chances of a projectile exploding in the tube is reduced to a minimum.

Another original but scarcely practicable electrical device is that suggested by two inventors of Russian birth. Their method consists in utilizing the tremendous heat generated by the electric arc for boring holes in the hull of an enemy's ship. There are various ways in which this could be accomplished, in their opinion, but preferably a submarine boat should be employed. They propose operating as follows: Having reached a point immediately beneath the vessel that is to be attacked, the operator would attach a copper wire to her bottom (it is not stated how this would be done). The wire would then be connected to the negative pole of a powerful electric battery, a second wire being attached to the positive pole and terminating in a carbon stick similar to those used for arc lighting purposes. By then causing an arc to be formed between the metal hull of the vessel and the carbon, the former would be melted, leaving an opening through which water would enter. According to the inventors, it would take but a very short time to bore a sufficient number of such holes as to cause the vessel to founder.

There are also several new inventions which have for their object the substitution of the electric spark for the detonating cap in rifle cartridges. One of these devices is the invention of a Philadelphian, and consists of a magazine gun with a small storage battery in the stock. Each cartridge to be used in a weapon of this nature has two short wires embedded in the powder, the points of which project out of the rear end. The act of pulling the trigger causes these points to be brought into contact with another pair of wires connected with the battery; the circuit being thus closed a spark is communicated to the powder and the cartridge exploded. The main apparent objection to such an arrangement is the necessity of an army carrying a dynamo plant with it during a campaign for the sole purpose of recharging the storage batteries in the stocks of the rifles.

General Edward W. Serrell, the inventor of the hydraulic vertical gun-lift for barbette guns, has, it is asserted, also invented a device by means of which a bolt of electricity can be hurled from a height upon the deck of an enemy's vessel that happens to come within certain bounds. The exact nature of General Serrell's invention is not as yet generally known. It is understood, however, that the device calls for the erection of two towers on opposite banks of a river or bay high enough to allow of a vessel passing under a cable stretched between them. On the latter will operate the electrical engine of destruction, which will be under thorough control from the shore. In connection with the device, and in order to show the exact position of the vessel, there will be an instrument somewhat resembling the range-finder. When a vessel enters a certain zone, a discharge of electricity will take place, so it is claimed, striking the ship's deck and tearing its way through to the water. General Serrell, it is said, perfected his device several years ago, and entrusted the plans and specifications to the government, which has had them in its possession ever since. So far the details of this new electrical engine of war are known only to General Serrell and certain government officials, who will not make them public. —*Electricity*.

#### Artificial Moon.

A novel system of electric lighting is being employed in the new library of the Columbia University, New York. In the center of the hall there is suspended from the dome a large wooded globe

about seven feet in diameter, painted a light gray tint. On to it from the four corners of the building are projected beams of light from four powerful arc lamps concealed in the woodwork. A beautifully soft light is diffused into all parts of the hall from this artificial moon.—*The Engineer*.

#### The Holland Submarine Boat.

There is a general belief that an effective underwater war-ship would have the above-water ship at its mercy, and we think that the belief is well founded. Of all naval devices that have been made the object of painstaking invention, there is probably none whose history at once dates back so far and includes so many repeated and heart-breaking failures. We say this with the knowledge that submarine boats have been built which have contained many of the elements indispensable to success. Unfortunately, in most cases there have been defects which ultimately relegated the device to the rubbish heap. The reason for this is not far to seek. Submarine navigation and warfare are in the nature of things so difficult, are beset with so many contingencies, that the ships in which they are carried on must be marvels of ingenuity and constructive skill and must meet a number of exacting requirements which never trouble the designer of a ship of the ordinary type. The Holland boat is the last of several that have been built by the inventor during the past twenty years. It embodies the results of a wide experience, and its trials indicate that the type contains all the elements of success. The larger boat the *Plunger*, now completing at Washington, will have speed, great offensive power, and a wide radius of action. It will be capable of joining a fleet, cruising with it, and forming part of the line of battle.

It is scarcely necessary to point out the deadly execution which could be wrought by such a vessel, not merely at night, but in an open battle by day upon the high seas. If the ordinary torpedo boat destroyer, which makes its dash upon the enemy in the open at the risk of being sunk by gun fire, is so dreaded by the larger warships, what shall be said of a torpedo boat which can sink beneath the waves and deliver half a dozen torpedoes from an unseen and unassailable position? If it is deadly by day and in the open, it will be doubly so by night. No searchlight would be powerful enough to detect the insignificant conning tower of an approaching submarine boat before it was well within striking range. No roadstead would be secure from its attack, and no fleet would dare to enter a harbor defended by these invisible, swiftly moving and destructive little craft; indeed, it is difficult to imagine just what would happen if a flotilla of these deadly little vessels were dispatched against a fleet of the enemy's ships.

A series of tests were carried out on March 27 for the benefit of Lieut. Sargeant of the naval auxiliary board. The work was done in thirty feet of water and gave full satisfaction both to Mr. Holland and the government expert. The first trials consisted of a series of surface runs at a speed of ten knots, in which the boat showed great maneuvering power, changing her course through ninety degrees with astonishing rapidity. The diving test was made at the same speed, and upon the diving rudders being thrown into position, the boat buried her nose and went down at an angle of fifteen degrees with the surface. At a depth of seven feet, as indicated by her flagpoles, she came to an even keel and ran forward steadily for several hundred yards. An ascent was then made, the boat coming up nose first at the same angle as she descended. The cover of the conning tower was then thrown open and Mr. Holland announced that he would dive completely out of sight. This time she dived completely out of sight, the flagpoles disappearing altogether. No trace of the vessel was visible until she made her appearance suddenly at a point several hundred yards distant from the point at which the descent was made. Later a test was made of the bow aerial torpedo gun, and with a reduced air pressure of six hundred pounds (as against the full pressure of 2,000 pounds) a dummy torpedo was thrown a distance of five hundred yards.—*Scientific American*.

A balloon for use in war has arrived at Fort Wadsworth, Staten Island, from Fort Logan, Colorado. It is in charge of Sergeant Baldwin, an experienced aeronaut, and will shortly have a trial, should the weather prove favorable. The balloon is made of silk and requires some 14,000 cubic feet of gas to inflate it. The plan is to fit it with search lights and a telephone.

Mr. Edison is credited with a plan to detect torpedo craft by scattering floating cans of calcium carbide and phosphide beyond the effective radius of these boats, thus silhouetting any boat within such radius.



# NEW INVENTIONS.

## Reclining Swing.

A reclining swing, which includes in its make up some of the better features of a hammock, is the recently patented invention of William E. Elliot, of Brashear, Mo.

This swing is in shape of a comfortable chair, square-built and having a back portion, which, by the operation of a lever, is made to drop backwards when the swinger wishes to assume a reclining position. The chair is suspended by ropes, and as a means of pleasure and rest, especially during warm weather, has much in its favor.

## Marine Velocipede.

A water-bicycle, or marine velocipede is a new invention patented by James F. Grady, of Boston, Mass., and Michael Hart, of Cambridge, Mass. In this invention a bicycle frame and gearing are mounted on a series of pointed cylinder pontoons to which are added a propeller-shaft and screw operated by the feet of the rider. The pontoons are cigar-shaped, three in number, the rear two of which are opposite and engaged by the bifurcated rear support of the bicycle frame. There is also attached a steering gear.

It is in order now for some enterprising inventor to construct a bicycle arrangement, by which a patriotic American can straddle a marine torpedo and so drive it against a Spanish warship. In such an enterprise, it is safe to say that something would happen to both ship and man. The latter would at least be a hero—a defunct hero.

## Electric Cotton Picker.

Inventions in the electrical field have become so extensive that we have ceased to be surprised when a new wonder makes its appearance. One of the recently patented ideas in this line of inventive thought has to do with an electric cotton-picker, which is the product of Arthur A. Hamerschlag and Theodore H. Price, both of New York.

This cotton picker consists principally of a rotating electric generator and two rotating cotton collectors moving at different speed from the generator and located in inductive relation, so that the cotton collecting wheels can be charged from the generator. The apparatus is carried upon a wheelbarrow, which is pushed between the rows of cotton, the balls from each row of which—one on either side of the picker—are attracted and engaged by the revolving collecting wheels or disks.

A machine that will pick cotton rapidly and effectively will indeed be a boon to the cotton grower in this time of low prices, and a practical apparatus for this purpose undoubtedly be welcome.

## Making Butter-cake.

Frank Burger and Henry M. Williams, of Fort Wayne, Ind., have invented and patented a butter cake and means for making the same. This consists of a hand press made of two oblong flat boards hinged to a shallow boxed center piece of the same shape, in which is a round hole, wherein the butter for making the cake, is placed. The bottom board contains a circular, corrugated moulding-piece and the top board a circular, oval-top pressure mould, having a plug in the center. So when the apparatus is closed, the top mould makes a depression in the butter, while the plug forces its way through to the bottom. The advantage of this is that the butter-cake receives a hallowed impression, to be used for holding ice, while the hole carries off the accumulated water.

## Bath-tub Seat.

A simple and very convenient seat for bath tubs is a recently patented invention of William Burrows, of Brooklyn, N. Y. In this there are hangers suspended from the rim of the tub and depending into same, having at their lower middle portions projections, on which the seat—arranged cross-wise of the tub—is secured.

## Pneumatic Tire Armor.

Robert C. Hansel, of San Antonio, Tex., has been granted a patent for an armor for pneumatic tires, which consists principally of a transverse series of over-lapping plates or scales—an alternate series consisting of a number of plates hinged together at their adjacent edges, and an intermediate series, consisting of other plates hinged together and arranged to lap the alternate series lengthwise of

the tire. The plates are also provided with slitted ears, the adjacent plates of each series being united by head pintles, which fit loosely into the ears.

## Bicycle Wheel.

John Brown, of Providence, R. I., is the inventor and patentee of a new bicycle wheel, in which the principal feature consists of a series of springs fastened to the outer part of the wheel rim. The latter contains outwardly extending flanges, unto which one end of each spring fits, the other end being loose and extending backwards with an upward inclination: so that when the wheel is in motion the spring presses down on the rim, beginning the pressure near the fastened end of the former.

## Fruit Picker.

Now that the fruit season is near at hand good fruit-pickers should be in demand. A good apparatus of this kind seems to be one recently patented by Robert Anderson, of Mount Hehman, Canada. This comprises an elevating pole containing an operating rod connected by a hinged lever to the fruit-catching bag held at the top of the pole. The mouth of the bag is cut downward to a V shape, and is extended by means of a wire frame, hinged at the corners. The frame, and consequently the bag is opened or shut by pulling the staff-rod up or down. The bag mouth is pushed over the hanging fruit, and by bringing its jaws together, the fruit is cut off, then drops into the bag.

## Cashier's Protector.

George B. Fry, of Bynum, Montana, has been given a patent for a cashier's protector, which has to do with the little window through which money flows. This apparatus comprises in greater part a frame with side-bars, a shaft holding a screen mounted therein, a spring for forcing the screen downward, an operating lever and an armature and electro-magnet.

The main advantage of this invention is in the ability to close the cashier's window instantly by simply pressing an electric button. The value of such an apparatus can be well understood by bankers who do business in places where the road agent is liable to make a porthole of the money window and to demand everything of value in the bank. In such case the cashier at once makes a barrier between the robber and himself and spreads the alarm.

## Shoe Lacing-hook.

A patent for a lacing-hook for shoes has been granted Lewis F. Earl, of Philadelphia. In this there is a body part attached to the shoe, and provided with upright post having a jaw pivoted to it. There is a nose piece, movable to and from the body portion, having a shoulder below the pivot and forward of the post to receive and support the lace when the hook is closed. There is also an extended portion acting in connection with the body part to keep the jaw from opening, and a spring, carried by the body, constantly acting upon the pivoted jaw to cause it to open normally when the tension on the lace is relieved or removed.

## Automatic Newspaper.

Luther C. Crowell, of Brooklyn, N. Y., is the inventor of a device for preventing the re-selling of newspapers. A folding mechanism is employed in effecting this result, which consists of a metallic device passed through the free edges or piles of folded sheets and fastened, so that the sheet or pile cannot be separated without being torn; thus giving positive evidence that the publication had been used.

## Letter Composition by Photography.

There has been invented and patented in England and the United States, by William Friese Green, of London, England, an apparatus for letter composition and a means for photographing the same. In this letters or characters are arranged into words by mechanism having a number of movable character-bearing strips released from holding-up stops and arrested at a required position by stops employed for this purpose. These stops are operated by means of keys and keyboards, in connection with a traversing carriage, which moves from one vertical row of arresting stops to the next row of these at every manipulation of the keys. There is also a spacing-key with a corresponding key-bar, for properly arranging the words and justifying the line "set" matter.

On the front of the machine is attached a shelf, on which is placed a camera with its glass facing the collective center of the characters, so that when

a line is formed by the machine the camera shutter, by hand operated mechanism, is opened and a photograph made of the letter composition. The operator simply manipulates the keys, as in a type-setting machine.

When the photographic plate is full, it is then ready for transference to the lithographer's stone from which any number of copies can be taken.

## Cinder and Smoke Device.

Anything in the inventive line that will allow a passenger on a locomotive to keep the coach window open while riding, without looking like a coal-heaver at the end of the journey, will indeed be a boon to the travelling public. And if the recently patented invention of Augustus P. Miller, of Baltimore, Md., does what is claimed for it the traveler will be grateful. In Mr. Miller's invention the smoke stack of the locomotive has attached a cylindrical gooseneck bifurcated at its lower portion, the ends of the divided portion each terminating into a receiver for cinders located at the sides of the engine. To the gooseneck is also attached a pipe, which can be made, by the employment of flexible joints, to extend the whole length of a train. This pipe has a bell mouth, at its forward end, located near the top of and just ahead of the smoke-stack, from which it runs back over the cars having a section of pipe to each car and a flexible joint where the cars come together.

With the use of this it seems impossible for smoke or cinders to come in contact with passengers, though windows and doors be left open; for as the refuse of the furnace passes up the smokestack, the smoke enters the pipe and is driven back toward the end of the cars by the air that is constantly rushing through it. The cinders are caught by a screen and sent down, also by air force, to the receptacle mentioned.

## Gold from Sea Water.

The Klondyke is not in it with a unique experiment which is being made at Lubec, Maine, a small town about sixty miles down the coast from St. John, N. B. A company known as the Electrolytic Marine Salts Company have spent a large amount in the buying of land and the putting up of a large and expensive plant for the extraction of gold from the salt water. The promoters claim that the fact that there was a proportion, or perhaps better, a trace of gold in salt water has been known for years. But to extract it in paying quantities and at not too great a cost has been theirs to discover. They claim at present for an expense of \$150 per week they are taking gold to the value of \$760 from the water. Their present plant, which they value at \$50,000, they claim will give at its full capacity profits amounting to about \$1,500 per week. It is the purpose of the promoters to very largely increase their plant this summer, putting on 500 men to complete the work, when they expect to extract \$10,000 worth of gold every 24 hours.

## The Panama Canal.

The international commission sent to inspect the Panama Canal workings and report on the advisability of continuing the work, after spending nearly a month on the isthmus, has sailed for Europe by way of New York. As announced in our columns some weeks since, the future of the project depends largely on the report of this commission. Press dispatches state that the commission was favorably impressed with the present economical system of prosecuting the work, the contrast between which, and the extravagant manner of conducting the work under previous administrations years ago, being very apparent.—*Railway Review*.

On the night of December 3 last, an aged couple named Mr. and Mrs. John Cocklin, living about eight miles from Schenectady, N. Y., in the town of Glenville, were brutally assaulted by two robbers. They were placed on a red hot stove and tortured in other ways. The night of this crime was the same as that on which George R. Blodgett, the General Electric patent attorney, was murdered by burglars, and it has been generally believed that both acts were committed by the same persons. A few days ago in Salem, Washington County, Mr. and Mrs. Cocklin positively identified "Buck" Davis, the burglar, as the man who had tortured and robbed them. Detectives who have been working on the case believe they will be able to fasten the Blodgett murder on Davis.—*Electrical Review*.

The Illinois Steel Company has issued a 42-page, 5x7½ inches, handsomely bound pamphlet entitled "Illinois Steel Company, Chicago, U. S. A." which contains a complete description of the various works of this extensive plant.



## DIRECTORY OF PATENT SOLICITORS.

Alphabetical list of practitioners who have registered and are therefore in good standing before the U. S. Patent Office. They are commended to the favorable consideration of inventors, manufacturers, promoters and others.

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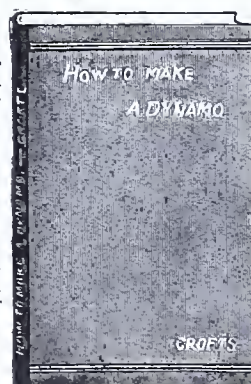
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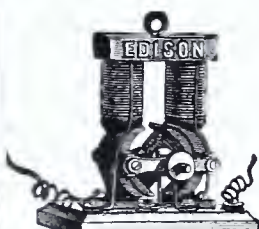
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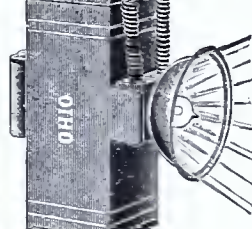
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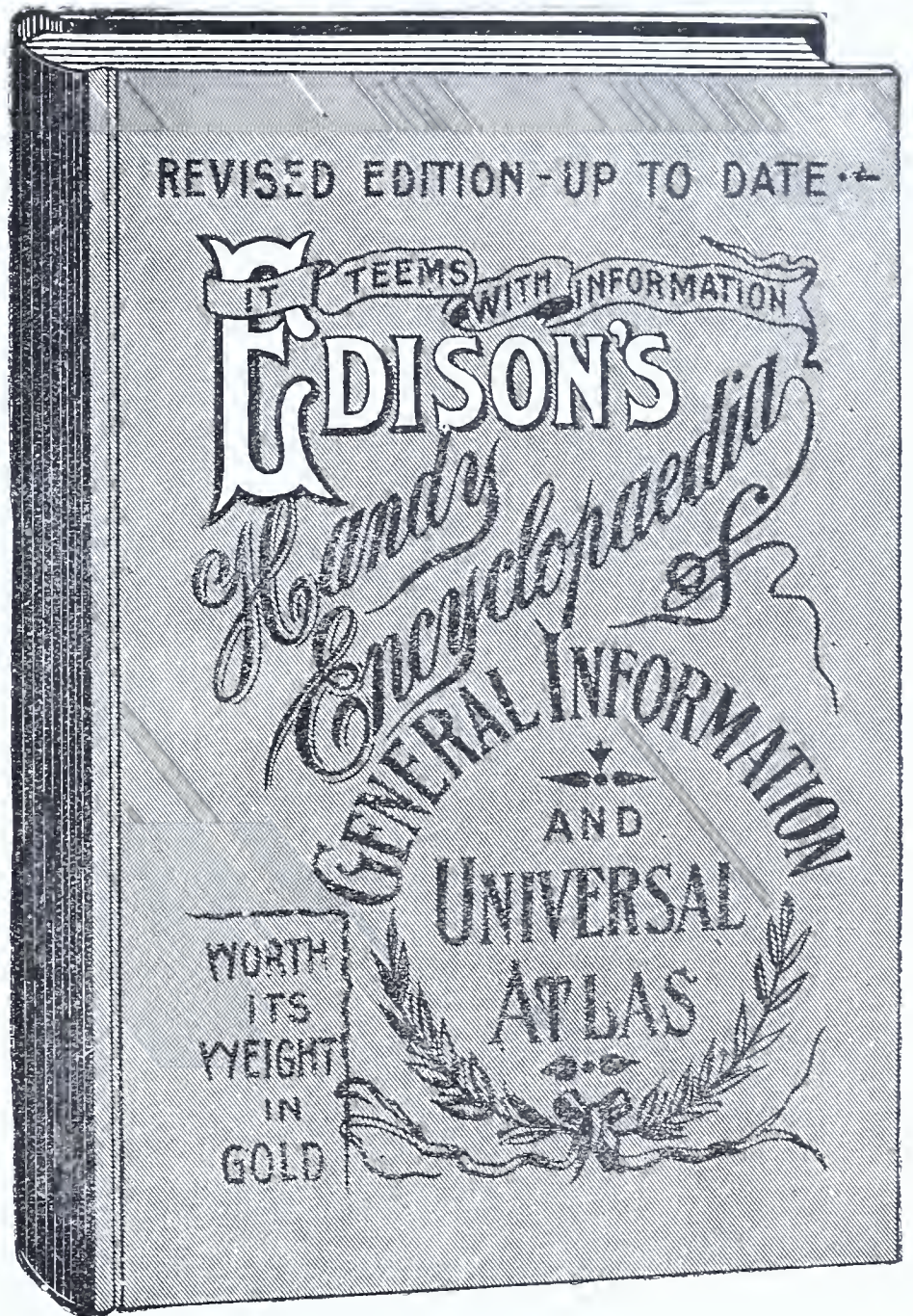
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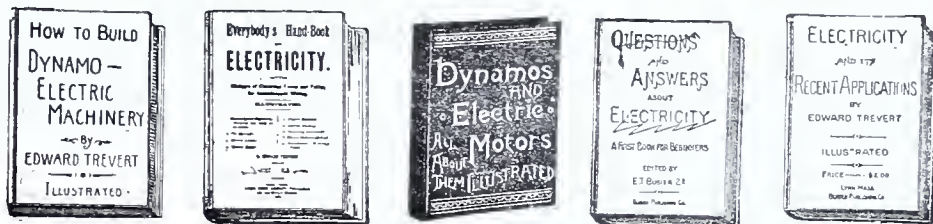
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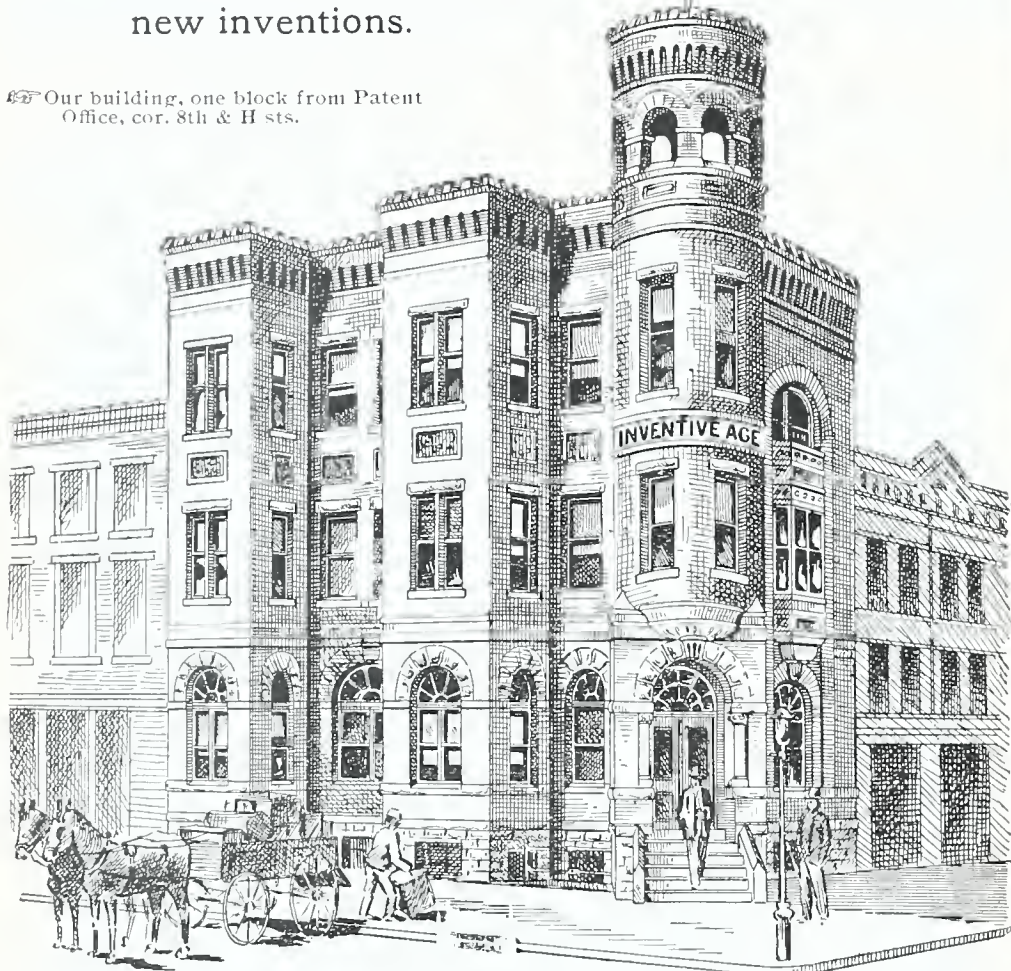
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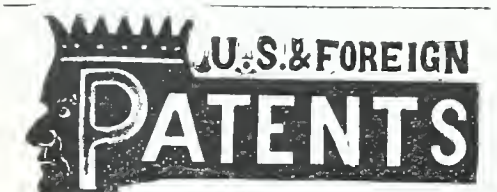
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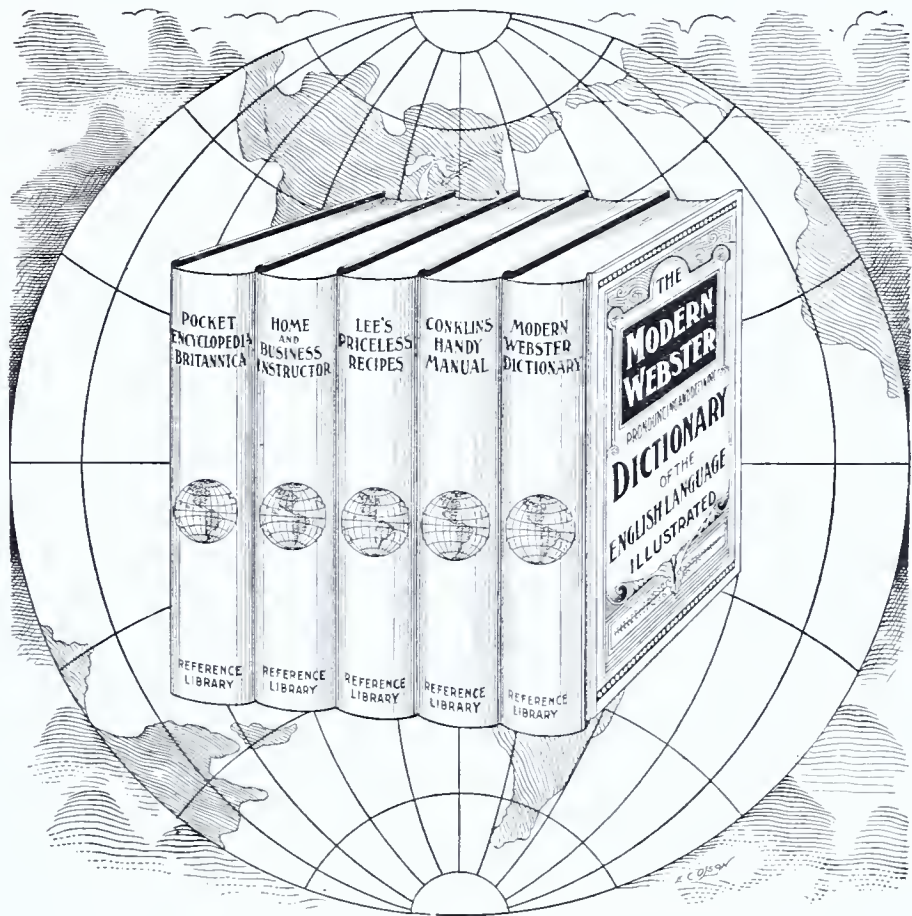
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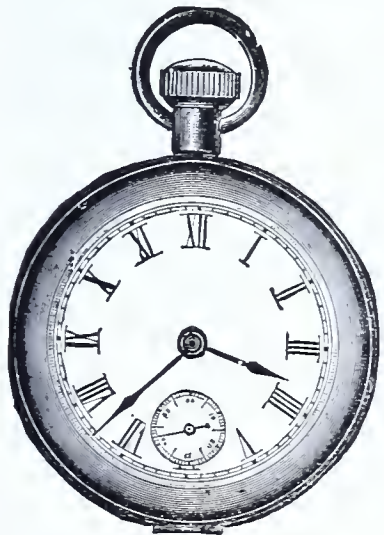
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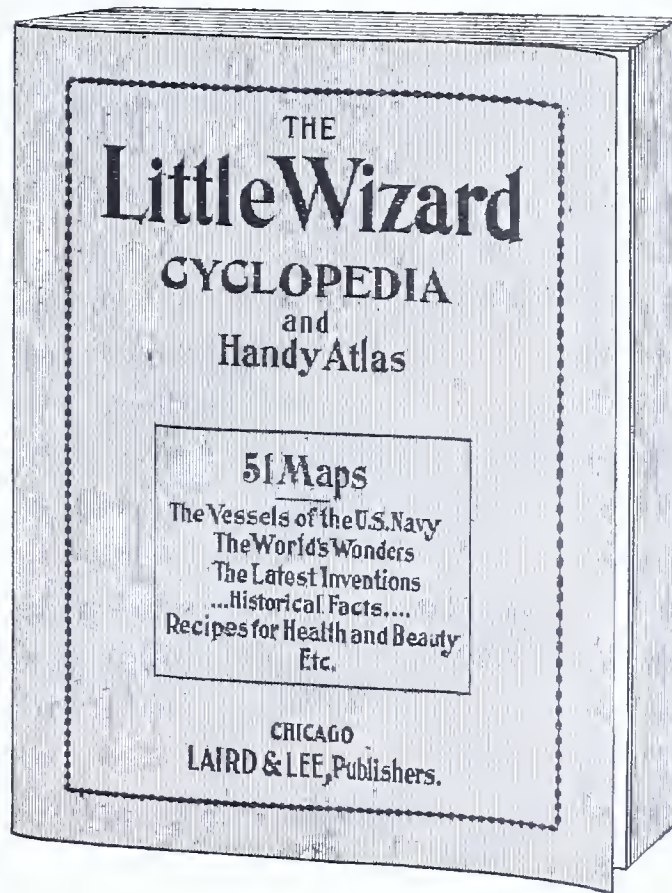
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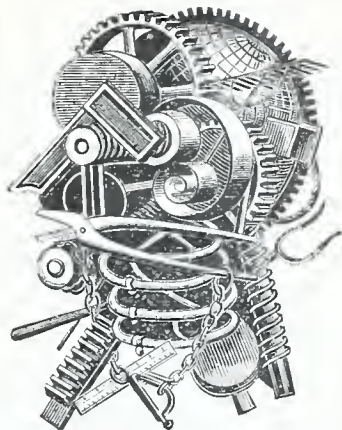
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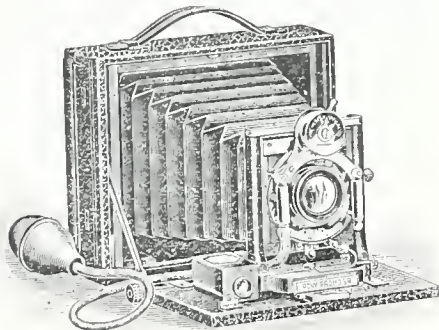
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No. 6.

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### Automatic Cigar Vender.

The illustration presented herewith shows something entirely new and novel in the automatic vending line. The inventor of the ingenious device that surmounts all former obstacles in the way of automatically vending cigars from the original package—thus meeting the requirements of the Internal Revenue Department, and the parties who are associated with him in the Dunham Machine Company, organized for the promotion of the business, are well known Washington gentlemen.

Great progress has been made in recent years in the use of coin-controlled (nickel-in-the-slot) machines.

The business as ordinarily conducted simplifies the means of bringing the consumer directly in contact with the producer, giving to the latter the large profit that is usually obtained by the middleman and retail dealers, and as the sales to the public are unaccompanied by the ordinary expenses of a retail business, the result insures a corresponding large profit to the company employing them.

The Dunham Machine Company was formed, mainly to facilitate the sale to the public of cigars through the medium of coin-controlled machines, and presents a device that is not only almost human in its workings but one that satisfactorily meets the requirements imposed by the United States Internal Revenue Department in vending cigars direct from the original package to the purchaser.

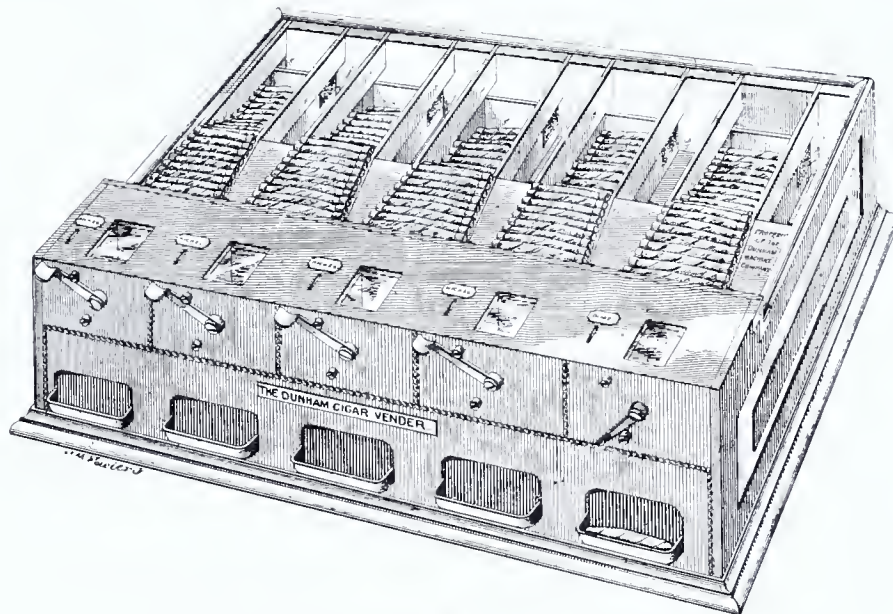
This latter achievement has been the insuperable barrier in the commercial pathway of inventors, who have attempted to market machines for like purpose, and on account of the government prohibition their commercial success could not be demonstrated; but if the future of vending cigars by the employment of coin-controlled machines can be read in the light of the past history concerning slot machines generally, it may confidently be affirmed that this machine will increase its hold on public favor, and money will be rapidly made by those who will embark in the business.

An idea of the general appearance of this cigar vender may be obtained by glancing at the cut on this page. The first impression conveyed upon viewing this means for vending cigars is that it not only has a symmetrical look that is pleasing to the eye but that its prime characteristic is the attractive manner of exhibiting the various kinds of cigars and the opportunity offered to the customer for the inspection and selection of the brand of cigar which he wishes to purchase. Each cigar vending showcase contains a variety of popular and reliable brands of cigars of a given price and in a sufficient number of varieties to afford to the most fastidious purchaser a color and size selection. All of these brands are exposed to view in their original boxes and are withdrawn therefrom

in continuous layers by means of a chain conveyor, or harness, that feeds them in an attractive manner over a display plane located immediately beneath the glass top of the case.

By this arrangement the cigars are not only vended direct from the box to the purchaser in accordance with the Internal Revenue requirements but a person standing in front of the case and looking through the glass top thereof can see at a glance and to the best advantage, in extended display, all the goods in the case and will be enabled to readily select for himself, without asking any questions, the brand, color, size and price cigar that suits his fancy—and which he can purchase by simply depositing the proper coin in the slot opposite the box containing the cigar he desires and pressing a similarly located operating bar sufficiently to cause the delivery of the cigar.

This simple manipulation is accompanied by the



THE DUNHAM AUTOMATIC CIGAR VENDER.

sounding of a tiny bell that indicates by its tone which brand has been sold, and is followed by the deposit of the coin in the inspection chamber at the front of the case. The object of such an observation chamber is to show clearly to the public and the store keeper the last coin deposited for the purpose of indicating the amount of sale and to present a ready means for the detection of anyone attempting to rob the machine by the employment of a "dummy" or counterfeit coin.

The coin-controlled mechanism for transmitting motion to move the chain conveyor and deposit the coin is simple, well designed and perfect in every part and may be easily made and readily put together and when assembled runs with faithfulness and exactness.

The parts are composed of metal of as light weight as compatible with the work they are required to perform. The mechanism is contained in a metallic frame or casing that is set into the case so as to form an upper front cornice, which is highly nicked or enameled to give the case a fine appearance and which serves to prevent per-

sons from leaning on the glass top of the case. The manufacture of these mechanisms is very simple and inexpensive while the parts thereof are capable of ready adjustment and repairs so that the cost of maintenance is inconsiderable; and as the machine is especially adapted for advertising purposes, the revenue that can be derived from each machine, as an advertising medium should be sufficient to pay the cost of collections and repairs.

There are many ideal places where such a machine would become a popular and profitable agency for the selling of cigars; in fact its scope commercially is as wide, as limitless indeed, as the range of the cigar business in the United States where four billion (4,000,000,000) cigars are sold annually.

The manner of exhibiting and vending cigars proposed in the employment of this machine is not a violent perversion of the present method of selling cigars. In fact it shows the various kinds to customers so that they can make a satisfactory selection without handling, thereby avoiding the loss from breaking consequent from handling during certain seasons of the year. The prevailing system of selling cigars taxes without reason and collects without mercy while the advantages of this system must be obvious on the slightest reflection. It represents the highest attainment of convenience in that it causes no interruption to other business carried on by the merchant and thereby saves from one-third to the whole of a clerk's labor. It prevents at the same time the smoking up of the profit, which occurs in nine cases out of ten; and the rapidity with which the sales can be made destined it to supersede the old method in a great number of stores.

Notwithstanding all these economical advantages it is not proposed to levy on the retail merchant for its use but when reliable merchants are found who would be desirous of availing themselves of this machine it will be installed in his store at no expense to himself while the large stock of cigars which will be furnished will require no investment on his part, and if it is a place where a lively trade is carried on in tobacco small consignments will be provided sufficient to keep him well supplied. On all cigars sold through this machine while in his store he will receive the same profit per brand that he now receives, and that without the investment of a cent—simply by allowing the space in a conspicuous part of the store for the machine.

It is proposed to handle nothing but reliable brands of cigars that have achieved a reputation unequaled by any other in that part of the country where sold.

It has been determined by a canvass of many drug stores that the above proposition meets with unanimous approval, readily secures the good will

(Continued on page 84.)



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WASHINGTON—NEW YORK, JUNE, 1898.

At last China has become sufficiently enlightened to remove the restriction of the use of steam in the navigation of the rivers of that country. Heretofore this motive power has been prohibited.

No less than 6,000 persons witnessed the opening of the Electrical Exhibition in Madison Square Garden, New York on the 2d ult. President McKinley touched the golden key—at the White House in Washington—that set the ponderous and intricate machinery in motion. The exhibition was a great success in attendance and one of the finest displays of electrical machinery and kindred apparatus ever made.

CONGRESS will undoubtedly pass the bill, favorably reported from the committee on manufactures, providing for the incorporation of the National Association of Manufacturers. This association is not formed for profit but for the purpose of advancing the manufacturing interests of this country and to extend its exports. No other association ever formed has done so much of real commercial benefit to this country as the one that now seeks the broader field that national incorporation will open to the work of the organization.

THE AGE is glad to state that the bill to investigate necessary revision of the statutes relating to patents, trade and other marks, and trade and commercial names, was some weeks ago passed by congress. The act empowers the President to appoint three commissioners to conduct the investigation, who are to report to congress such revisions necessary to make our laws conform to recent international agreements. The President has not yet appointed the commissioners, but in all probability, this will be done in the not distant future.

GEORGE H. HOLGATE, as the representative of the Association of American Inventors, Philadelphia, has been cited to appear before the commissioner of patents on the 15th inst. to show cause why he should not be disbarred from practice, because of fraudulent transactions involving a large number of inventors. It seems that it was the intention of the patent bureau not to institute proceedings on complaints filed at first owing to the fact that Holgate was not registered as a patent attorney on January 1st last, but inasmuch as his representative on January 14th filed a list of 171 cases pending prior to January 1st and in which registration was waived, it has been decided that Mr. Holgate is still practicing before the office and within the provisions of the statute he is subject to disbarment. If one-half the charges against the Association of American Inventors can be substantiated, Holgate will soon follow the rest of the patent selling hum-

bugs into obscurity. Probably no other concern in the country has been guilty of such gross deception as this Philadelphia association with bank references of "reliability." It is astonishing how many inventors are fooled in the matter of references. A bank reference, to an inventor, is of little value—frequently of positive damage. Banks do not have time to examine the methods of those who leave deposits in their institutions. The biggest patent shark always gives bank references as to "responsibility," and the inventor is led to believe that "financial responsibility" includes honesty and fair dealing. Far from it. The greatest rascal may have a good bank account, and he may have acquired his wealth by the most shameful practices on innocent and unexperienced inventors.

## The Case of Thos. G. Orwig.

We publish the letter of a complaining attorney, addressed to the Chairman of the House Committee on Patents, as a sample of this class of complaints. It is true that at the present time, (unless excluded for misconduct) "any one who deems himself or herself, competent to practice, [before the Patent Office] may attempt to do so." It is not true that the Commissioner, as the complaint states, "returns the paper or suggests correcting." It is impossible for the office to undertake to aid incompetent attorneys, or even to act as an attorney for applicants.

As a consequence of this unrestrained admission to practice, the business of soliciting patents has been taken up by very many men more or less incompetent and by not a few utterly unfit for such work.

The result has been that the work of the office has been greatly augmented, and the clients of these incompetent attorneys have been defrauded; in many cases doubly defrauded, for, as usually happens with these men, the patent fails to cover the invention and the inventor, not only loses the money paid in fees, but also the invention itself.

But the evil has gone further. Having no reputation for training, experience or skill, these men becoming solicitors merely by putting up a sign and printing letter heads and advertisements, use misleading and practically fraudulent means for procuring clients.

Naturally a business founded in humbug, proceeds and flourishes by the same means. The impromptu attorney sometimes dubs himself the "International Patent Law Association," or the "Alaska Patent Office," or the "Inventors and Manufacturers Patent Soliciting and Patent Selling Association, Offices All Over The World." Usually a book is issued containing some things true and others false; the truth being borrowed, and the false original. Mixed with some shreds of patent laws and copies of patent office rules, are puffs on the manager, and various mythical officials of the "Association," a handsome picture of some large buildings in the neighborhood, labelled "view of our office," and separate photographs of the four sides of one room, made to do duty as an immense suite. The personal bragging is also immense, all the pretensions of knowledge of the law, science and mechanical art, which cold type can express, are put into the book, as a part of the outfit of the concern.

Add to these recommendations, invented or procured from accommodating friends, or perhaps from members of congress, easy to give commendation if solicited just before election. Perhaps, (the cunning of money getting is subtle) the advertiser simply pretends to be "an inventor and mechanic" or "a natural genius," and "familiar with the patent law."

Supplied with these advertising aids, instead of years of study and training, these "patent attorneys" spread abroad their advertisements. Unhappily a large part of the business is done through correspondence, and the client does not see his attorney. Unhappily too, the inventor in (perhaps a majority of cases) can not distinguish a capable from an incapable attorney; indeed this is true of a very large proportion of new inventors. Dupes are easily made, and with the unhappy result

indicated above. Nobody is profited except the so-called attorney.

Of late years these men have not been content to wait the natural evolution of invention, but have sought to increase the growth by false stimulus, and by offer of prizes, by rolls of honor, and by exciting vain expectations of sudden fortunes, have fathered a bastard breed, of which necessity was not the mother.

The mischief produced by these practices had become so great and notorious that the commissioner of patents was compelled to commence warfare against it. In this he was aided by reputable attorneys, and the press, and in this the INVENTIVE AGE took no small part. A good beginning has been made. Much yet remains to be done. The patent office is an important court, the business requires skill, learning and expense, faithful devotion to the interests of clients and honorable conduct towards the office. The purpose of the office and the bill referred to in the communication, is to cause an examination to be made, as in the courts of applicants for admission to practice to the end that incompetent men may be excluded—and the office saved from trouble and the public from swindling. This strikes us as reasonable, but attorneys have a sympathetic feeling for their fellows.

It seems also reasonable and wise to admit to practice in the patent office, lawyers, admitted to practice before the courts. These gentlemen, in ordinary law practice, sometimes, but not often, appear before the patent office, to argue some questions of law, but they have sense enough to associate with themselves an expert, when the interests of their client requires one, and they know how to select the expert or specialist.

The purpose of the bill is not to exclude those already recognized. That would not be practicable. Unfortunately the public must suffer and be duped by a class of incompetents, already in possession and not to be ousted unless they happen to be detected in some act clearly amounting to gross misconduct. But the fact that the law and the rules have heretofore left the door open to incompetence and humbug is no reason why care and strictures should not be exercised in the future. We know that the patent office has no other purpose or wish than to so regulate the admission to practice therein, that only competent men may be admitted, and that when a client having business before the patent office, places that business in the hands of an attorney recognized as such by the commissioner, he may be reasonably certain that the business will be intelligently and faithfully attended to.

The insinuation that the matter of re-examination for admission to practice before the patent office, will be left to a board of Washington attorneys, is gratuitous, and wholly absurd.

The officials of the patent office are competent to attend to that matter. They are not only competent, but they are fair, and they have no other interest than the admission of worthy and the exclusion of unworthy attorneys.

In our opinion, under his general power of supervision of the affairs of his office, the commissioner of patents has sufficient authority, subject to the approval of the secretary of the interior, to make rules regulating the admission of attorneys to practice in his bureau. But it would be well to have specific authority of law, for moral effect, as well as to suppress all contention on the point. In the security of the office, to facilitate the proper transaction of its business, and most of all to protect the public from imposition, some regulation, like that contemplated in the bill is of the highest importance.

The general opinion, according to the "Germany Pottery and Brickmaker's Gazette," has been that coal was first used as a fuel about 700 years ago, at Liege, in Belgium, but the fact is it was employed for this purpose at a much earlier date. This discovery was made on German soil in the beginning of the 12th century that the mineral we call coal was good to burn. The place where it was first obtained is exactly known, it is the present Kohlenberg, in Wurmthal. In the ancient chronicles this place was called Kalkulen, the same thing as Kohlenkull, later it was called Koalbery.



## ORWIG OBJECTS.

## An Open Letter to the Chairman of House Committee on Patents.

The following letter, addressed to the chairman of the house committee on patents, is the text for an article in relation to the same subject appearing in another column:

DES MOINES, Iowa, April—, 1898.

Hon. Josiah D. Hicks, Chairman of the Committee on Patents, 55th Congress, Washington, D. C.

SIR: As an humble private law-abiding citizen, after an experience of over a quarter of a century in preparing applications for patents for inventions and prosecuting claims in the United States patent office, I feel competent to discuss the pending House Bill, No. 6349, relating to the recognition of agents and attorneys, representing applicants for patents before the patent office.

I therefore respectfully submit the following for your observation in the consideration of said bill with a view of determining what is right in the matter.

1. As the law now is (Sec. 487, Revised Statutes) any one who deems himself or herself competent to practice may attempt to do so. Under said action the practice of attorneys in the patent office has been regulated until up to the amendment of Rule 17, of the rules of practice formulated by the commissioner, adopted and published by his authority in 1898.

When a novice or incompetent attorney presented an application that was *informal* the commissioner returned the papers, or suggested corrections, and thus guarded the interests of the inventors and the public. And under said section the commissioner has had ample power to disbar any attorney proven guilty of "gross misconduct," subject to the check and safe-guard that requires the approval of the secretary of the interior.

To augment the power of the commissioner, Rule 17 was amended so as to exclude all attorneys and practically disbar all attorneys who were not registered pursuant to that rule on or before January 1, 1898. By assuming power not delegated by law, said amended rule was used as a means to disbar attorneys without first giving them a trial and convicting them of gross misconduct by simply refusing to place their names on the new register.

The pending bill contemplates legalizing such proceedings—that is to prevent any person from practicing in the patent office after July 1st, 1898, who is not then registered.

That the bill contemplates giving power to the commissioner that the law has heretofore denied him is obvious. There is evidence that Acting Commissioner Greeley exceeded his authority in refusing registration. I can prove by the records, that the authority of a commissioner under a law such as the bill proposes may be abused, and citizens wronged is probable.

A knowledge of mechanics is probably more essential in fitting a person to prepare and prosecute applications for patents than a diploma from a law school. I venture the assertion that of the one hundred lawyers (more or less) in Des Moines, or the thousands in the State of Iowa, not one-tenth of the number will undertake to prepare and prosecute an application for a patent for an invention. And yet the bill provides "that any attorney-at-law who is in good standing in the United States having jurisdiction of patent causes, may, on motion duly made to the commissioner of patents, be registered in the patent office as an agent or attorney, without examination." This to my mind would be unjust discrimination. An inventor and mechanic who is a natural genius and is familiar with patent law may be a much more competent person to prepare and prosecute an application for a patent than three-fourths of the lawyers designated as above.

The members of the Bar Association of Washington who aided or suggested the formulation of the bill, may be an exception because they are probably all patent attorneys of experience and will probably be chosen as committeemen to examine applicants for registration as contemplated by section 3 of the bill, and are interested parties in that the less number of registered attorneys, especially non-residents of Washington, the better will be their opportunity to monopolize the patent office business.

I heretofore sent to you a copy of my pamphlet entitled "Remarkable and Anomalous Official Proceedings in the U. S. Patent Office," and also a copy of my Petition to Congress, stating my grievance concerning what I considered arbitrary, unlawful and unjust action by the Hon. Acting Commissioner Greeley in refusing to register me pursuant to Rule 17, notwithstanding I was eligible by the very terms of said rule and notwithstanding there was no charge against me. But upon the complaint of some one to me unknown (who was probably jealous or envious of my success as a patent

attorney in establishing a work-shop and office and advertising it as a patent office to distinguish it from surrounding offices) who stated in a letter that he lost some business because some inventors told him they thought my office was a government office, or words to that effect. Such statement may have been malicious, and yet solely upon such complaint and by *ex parte* proceedings the said Greeley refused to register me pursuant to Rule 17.

On the 27th of January 1898, the Hon. Willis Van Devanter, Assistant Attorney General, reviewed the action of the said Greeley and closed his report in the following words. "I respectfully suggest that the Orwigs be permitted to practice before the patent office without being registered under amended Rule 17," and said report and recommendation was approved in the same day by the Hon. C. N. Bliss, Secretary of the Interior.

But evidently said authority allowing us to practice was suppressed or countermanded because some of the examiners and other subordinate officers in the patent office send letters direct to our clients informing them we are not registered pursuant to Rule 17, and cannot be recognized and suggest other attorneys should be employed. Such action is disrespectful and disobedient to the action and authority of the Hon. Secretary of the Interior and if such insubordination occurred in the army during war, when lives are at stake, court martial and execution would be justifiable. And every such act of insubordination in the patent office and civil service when the reputation of citizens, inventor's rights and good government are at stake and for which some official is responsible, is a count in an indictment for insubordination that should demand trial and dismissal of any one found guilty thereof.

I have made complaint to the Hon. C. H. Duell concerning the matter and received a friendly reply dated March 22, in which the first sentence is as follows: "Your letter of March 12th, came duly to hand, and has remained unanswered for the reason that I have been examining the papers and proceedings in the matter of the differences existing between you and the patent office."

After full investigation, Mr. Duell may assert his authority and correct the wrongs complained of. I am aware that the actions of his predecessor (Mr. Greeley as Acting Commissioner) has placed Mr. Duell, the new commissioner, in an embarrassing position and I therefore have and will patiently await relief through his authority and only allude now to my personal experience to show the importance of guarding and protecting the rights of all who desire to practice as attorneys before the patent office. The bill, to my mind, is objectionable in that it would place undue power in the Commissioner, so that if he was prejudiced or malicious against any one that has heretofore practiced or who may desire to be registered to practice, such person might be arbitrarily and unfairly prevented from exercising his ability and rights as a citizen in preparing and prosecuting applications for patents for the inventions of his friends and patrons and thus be denied the inalienable right of choosing a vocation in the pursuit of happiness as guaranteed to him by the Declaration of Independence and the Constitution and for which he is by natural endowments, culture and experience well fitted to be a useful and honorable citizen.

I will send copies of this to Senator Gear and Mason and Congressman Hull, who know me personally, and of my business career as a solicitor of patents, and request them to confer with you in the consideration of the said bill whenever it is to be acted upon. Respectfully,

THOMAS G. ORWIG.

## A War of Science.

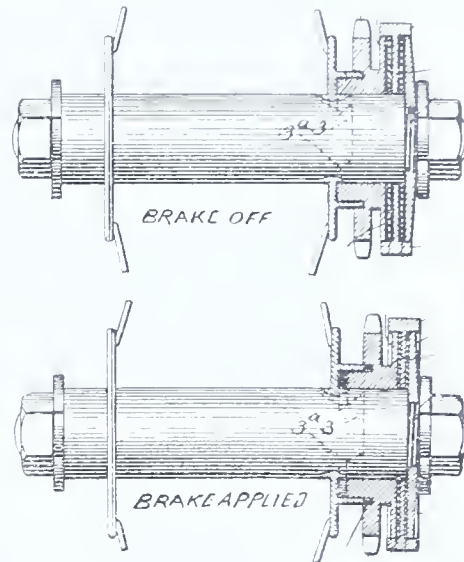
As was predicted some time ago, our present struggle with Spain is to a large extent one of mathematics and electricity. The only war that has ever been previously fought upon scientific principles, and in which modern electrical appliances were extensively employed, was that between Japan and China, and that contest can hardly be looked upon as a criterion in view of the little resistance the Japanese met with. It is no exaggeration to say that at the present day the result of a naval battle between two modern fleets might hinge on the rupture of an electrical conductor or on the burning out of an armature. As Lieutenant Bradley A. Fiske said a number of years ago, in an address before the New York Electrical Society, "Electricity is not used in warfare as a convenience, nor is it a fad of theorists—it hoists the ammunition to the deck; it trains and fires the guns; it gives, by means of the range and position finder, the distance and position of the enemy's ships; it gives a means of signaling; it actuates the torpedoes; it lights and ventilates the ship; in fact, it does good, honest, practical work." It will readily be seen that were any of the electrical apparatus employed in operating these various pieces of machinery to get out of order, a ship in a naval combat would be at a terrible disadvantage.—*Electricity*.

## Back Pedal Brakes.

That the conventional handle bar brake will soon be known only as a remnant of the "old style bicycle" is evidenced by the large increase in the sale of all standard makes of bicycles equipped with a back-pedal brake.

One of the objections to the universal use of this class of brakes, has been the wear on the tire when such devices are applied to the crank axle and have a "spoon" to engage the rear wheel-tire, and the throwing of the chain out of a proper alignment with the sprocket on the rear drive axle, when the brake device is in the nature of a laterally moveable clutch and friction brake.

Heretofore, clutch brake disks having lateral movement have been made to engage a fixed part of the frame from one side only, requiring a considerable lateral movement to effect a proper braking action, which retarded a quick braking and



also rendered the wear on the chain links uneven and often breaking such links, by reason of the lateral twist strain on the chain.

To overcome the objections noted, and to provide a back pedal brake having a quick and positive action and capable of effecting a maximum brake resistance with a minimum lateral movement of the clutch on the drive axle, whereby the chain always remains practically in its normal alignment with the line of draft, and whereby to admit of an easy and quick braking action without the slightest danger of loosening the pedals, or undue strain on the limb muscles of the rider, is the purpose of the back pedal brake mechanism shown in the accompanying illustration, invented by Mr. Silas Fader and recently patented by him in the United States and principal foreign countries, through his attorneys, Messrs. F. G. Dieterich & Co., of Washington, D. C.

The Fader brake differs from the clutch brakes heretofore produced, in that, the same embodies duplex braking surfaces operating against an immediately held friction disk, loosely mounted on the rear wheel hub, but held from rotation, whereby a very slight lateral movement of the chain wheel clutch will effect a braking action on the hub, through two distinct retarding means, equal to two or three times the lateral movement of the sprocket against a single rigidly held friction disk.

This form of brake bids fair to supplant all back-pedal brake devices, operating on the back or drive axle, now in use.

## Expensive Dueling.

The cost of a naval duel between two modern battle-ships in the value of projectiles and the probable damage to structure is estimated as easily approximating \$1,600,000. This little bill would be filled out in the space of sixty minutes, provided all the armament of each ship was in active service for that length of time. Should one or both ships be lost in the fray the loss would add tremendously to the above figures. A few naval battles of any proportion would pauperize a Klondike and make the tax payer wince. So long as it is a fashion to settle international disputes by these costly and barbaric methods the people must pay the bill, to realize that after all, the money dumped into the cellars of Neptune, if put into new enterprises and industries would make a hobo a rairity and a pauper as scarce as a fifth leg on a calf. Patriotism is one thing, but glory as it is generally understood never yet paid for a red herring.—*Age of Steel*.

The only apparent effect of the war on the electrical industry in the United States has been to set the majority of the manufacturing plants running day and night.



## Automatic Cigar Vender.

(Continued from first page.)

of all merchants and shows beyond a doubt that there exists a demand for such a machine.

The chain conveyors comprise two members that are made up of a series of paper links which are consecutively numbered in arithmetical progression, so that at a glance the number of cigars sold from a given box can be readily ascertained—requiring no book-keeping and avoiding all the difficulties of computation and liquidation, as the money received for the cigars is securely locked up in the case; and when the agent calls to make a collection, he simply calls attention to the number of cigars sold, makes an allotment of the ready cash obtained from the cash box and turns over the retail profit to the merchant at each collection.

The cigars are harnessed and packed in the boxes with the paper chains at the factory thus guaranteeing to the purchaser the surety of securing the brand of cigar he pays for without repeated and contaminating handling.

As before stated this machine is the only machine of the kind in existence and the only one meeting the requirements of the Internal Revenue Department. Under date of February 4, 1898, the Commissioner, in a letter to the Company, says:

"This machine affords opportunity for official inspection of original cigar packages without unlocking, and is intended to hold but one box of cigars at one time. The box to be used is the ordinary commercial cigar box which is intended to be packed at the factory and provided with a chain device to be adapted to fit over the ends of the cigars and packed therewith and afterwards to be attached to a part of the vending machine.

The construction and mechanism of this vending machine conforms to the rulings of this office and is approved.

Since the receipt of the above letter a fundamental and reliable patent covering broadly the basic features of the Dunham Cigar Vender has been secured and the rights thereunder are not in conflict with any other existing patent rights.

## Making A Ten-Inch Shell.

It has been very difficult to get in close touch with the methods of manufacturing of projectiles for the big battleships from the six-pounders up.

The Firth-Sterling projectile works at Demmler, near Pittsburg, are barred to an outsider; only representatives of the government and officials of the company have access to all the departments. Even the workmen of one department are forbidden to enter another. Here is the history of the making of a 10-inch shell:

In the casting shop molten steel is cast in a solid piece about 12½ inches in diameter. From the casting shop it goes to the forge room, where, after being reheated, it is hammered down to 10¾ inches, being considerably elongated in the process. It is then conveyed to the machine shop and placed in a specially constructed lathe. The base of the projectile is inserted in the lathe "chuck" and the conical end is swung from the lathe center. A "roughing" cut is then run over the shell, the shell itself is pointed, and then receives a finishing cut.

The only parts of the shell that bear against the rifled surface of the gun is the larger part of the conical end and the surface of a copper ring that encircles the projectile near its base. The copper is quite soft, so does not injure the rifling. After the finishing cut is given to the projectile, the diameter of the largest part of the cone is 10.5-100 inches, and that of the cylinder, which is the body of the projectile extending back from the cone, is 9.90-100 inches.

The workmen now apply the "band score," which is a groove cut for the reception of the soft copper band. For a 10-inch projectile the groove is 1¼ inches wide at the bottom and ¼ inch deep. The groove is wider at the bottom than at the top, so that the copper band retains its position after it has been placed in the groove and pounded down until the copper swells out and fills the groove, thus taking a flange hold on the under side.

Then the "extracting score" is cut. This presents sectionally a view like the letter V, with the letter lying on one side and the converging lines pointing to the base of the shell. This groove is made to permit a tool to be fastened to the shell

when it is desired to withdraw it from the gun. The shell is put in the cutting-off machine, where the surplus length is taken off. The next move is the boring of a five-inch hole in the bore to the depth of fourteen inches.

In the process of hardening the shell is suspended, point downward, in a receptacle filled with molten lead, and is allowed to settle until the hot metal rises above the cone base. At first the temperature of the base is 500 degrees, but is increased gradually to 1,300 degrees. The work of heating requires four hours, when the shell is withdrawn from the bath and sprayed with water to give it a hard exterior. It is then plunged into a bath composed of secret ingredients, and when withdrawn it is cooled with a jet of water.

The projectile again goes to the machine shop, the hole in the base is widened half an inch and the depth is increased two inches. The hole is "threaded" a few inches and a screw plug is inserted. The grinding room is the next destination, and here the extreme diameter of the cone is ground down to ten inches exactly. After a soft steel cap has been fitted to the tip of the projectile, on the theory that when the shell strikes the armored side of a battleship the soft steel preserves the point of the projectile without interfering with its penetrating power, the shell is finished as far as the Firth-Sterling Company is concerned. It is exactly 27½ inches long. After it has been received at some United States arsenal it is filled with an explosive compound and is ready for its work of destruction.

All large projectiles, from the 6-inch size up, are made as described. The machinery at the Demmler plant consists of twelve lathes, four boring mills, two cutting-off machines, two tool lathes, two chasing machines, one grinding and one centering machine. This equipment is being reinforced, as the company has enough work on hand for the government and foreign countries to keep the plant busy for two years.—*Anvil Sparks*

## Complexity of Modern Battleships.

Comparing the first and the last sea-going battleships built for the United States government by the Cramps of Philadelphia, Charles H. Cramp says, in an article in *Cassier's Magazine* for June: "The first was the New Ironsides, built in 1862. The last is the Iowa, completed in 1897. Each represented or represents the maximum development of its day. The New Ironsides had one machine—her main engine, involving two steam cylinders. The Iowa has 71 machines, involving 137 steam cylinders.

"The guns of the New Ironsides were worked, the ammunition hoisted, the ship steered, the engine started and reversed, her boats handled—in short, all functions of fighting and manœuvring—by hand. The ship was lighted by oil lamps, and ventilated, when at all, by natural air currents. Though, as I said, the most advanced type of her day, she differed from her greatest battleship predecessor, the old three-decker Pennsylvania, only in four inches of iron side armor and auxiliary steam propulsion. She carried fewer guns on fewer decks than the Pennsylvania, but her battery was, nevertheless, of much greater ballistic power.

"In the Iowa it may almost be said that nothing is done by hand except the opening and closing of throttles and pressing of electric buttons. Her guns are loaded, trained and fired, her ammunition hoisted, her turrets turned, her torpedoes—mechanisms of themselves—are tubed and ejected, the ship steered, her boats hoisted out and in, the interior lighted and ventilated, the great searchlights operated, and even orders transmitted from bridge or conning tower to all parts by mechanical appliances. Surely, no more striking view than this of the development of 35 years could be afforded.

"This growth of complexity and elaboration, and this almost infinite multiplication of parts and devices, have entailed upon the naval architect and constructor demands and difficulties never dreamed of in the earlier days. The staff required to design and construct an Iowa is multiplied in number and the complexity of its organization augmented as compared with that required for the design and construction of the New Ironsides almost infinitely.

"Similar conditions apply to command and management, so that while the building of a modern battleship entails enormous work and responsibility on the naval architect, constructor and staff, the effective use of her as a tool in the trade of war presents an equal variety and intricacy of problems to students of the art of naval warfare."

Hudson Maxim, the inventor of explosives, who has offered to the United States government his free services and all his inventions free of royalty for the building of a torpedo cruiser to cost \$5,000,000, says the boat he has in mind could destroy every Spanish warship which it might encounter. Dewey want such a cruiser?—*Electricity*.

## Patent Swindler's Abroad.

Among letters received just before we go to press is one showing us that a species of confidence trick which we long since exposed still survives. A gentleman, whose clever patent we noticed recently, writes us:—"I have much pleasure in informing you that on Saturday last I received a communication from the Academy of Parisian Inventors, stating that the Council of the Academy had conferred on me the title of Member with award of the First Class Diploma and Gold Medal for my invention." The vitality of these little swindles is astonishing! The confidence trick is still a means livelihood, the Spanish prisoner who knows of the exact locality of buried treasure is still offering to sell his secret, and even the professional picker-up of diamond rings can find a victim now and again. But the *modus operandi* of this "Academy" swindle is neater than most trickery, and possibly safer, so that it is, perhaps, no wonder that it is still worked. The first step is the dispatch of the gratifying intelligence above, in the best of grammar and the prettiest of hand writing on superlative stationery. The inventor is flattered. Naturally, he never heard of the "Academy of Parisian Inventors" before, but the French Academy is fairly well known, and that is near enough in sound. Besides, the superb stationery disarms all suspicions, the coat of arms in gold and colors would lend an air of respectability to the caligraphy of Bill Sykes himself. Consequently he writes an effusive acceptance, and possibly begins to use the letters M. A. P. I. after his name. Then there is a breathing space. In the course of the next few weeks, without undue hurry, he is informed, in excellent literary English, and the same superb note paper, that the Diploma is prepared, the medal is struck, and that the Academy merely awaits a remittance of the subscription and a few hundred francs for the bare cost of the metal and parchment before forwarding these richly deserved honors. Then, at least, if the inventor is a wise man, he will enquire who are the ruling spirits of the "Academy of Parisian Inventors," and from whence they derive their charter, and what is the exact value of their Diploma. He will probably find that the French trio who correspond with the English Dick, Tom, and Harry, run the Academy, or even that "Jules Durand, Secretary," carries about the whole concern in his boots. He will learn that there is no official recognition of such an academy, and that the exact value of the diploma is something less than the paper which was spoiled to make it.

It is just probable that the "Academy" can avoid a conviction on the charge of obtaining money under false pretenses. It is not absolutely illegal for the three tailors of Tooley Street to style themselves an Academy, and it is possible that the French gang send out a medal and a "diploma" of sorts on receipt of the money. But we think not. This swindle has been worked under several high-sounding names, and the promoters of the various enterprises have relied on a well-known weakness of human nature. They can be moderately certain that when the swindle is discovered the victim will endeavor to keep quiet the fact that he has been imposed upon. It is a pity that this should be so, but so it is. We urgently recommend any inventor who receives one of these gratifying communications to post it at once to the commissaire of the quarter of Paris from whence it comes. This will at least keep the worthy secretary of the Academy on the move, and will possibly cause him to disburse such sums in freshly addressed and highly expensive stationery, that the game will speedily lose its remunerative charms.—*Invention, London*.

## Covering for Ship's Armor.

A patent for an invention relating to ship's armor has been issued to John L. Mathews, of Baltimore, Md. This comprises a protective armor covering, consisting of rubber and Babbitt metal. The latter is secured to the outer surface of the rubber which in turn rests upon coiled springs that engage the ship's armor plating. Babbitt metal would afford but slight resistance to an armor-piercing projectile, but with its elastic adjuncts, it would in a measure decrease its destructive impact.

## A Grave Question.

It will be seen by the Patent Office Gazette that a "new, useful and cheap" device has been patented by J. A. Coffey, residing at 1542 Ninth street, N. W., Washington, D. C., for marking graves and monuments. It is designed to hold pictures or written sketches of the departed, photograph and any mementos of the dead. The front is first used as a casket plate after which it is used as a part of the marker. This does away with having a costly plate buried with the coffin and lost to sight forever.



### A Wave Motor.

The Wright Wave Motor Co., of Los Angeles, Cal., have installed a small model plant at Potencia, Cal., and are using the force of the waves, largely the buoyancy, to pump water against an air receiver. The accumulated pressure on the water is utilized by a Pelton impulse wheel, the water wheel being directly connected to an electric generator.

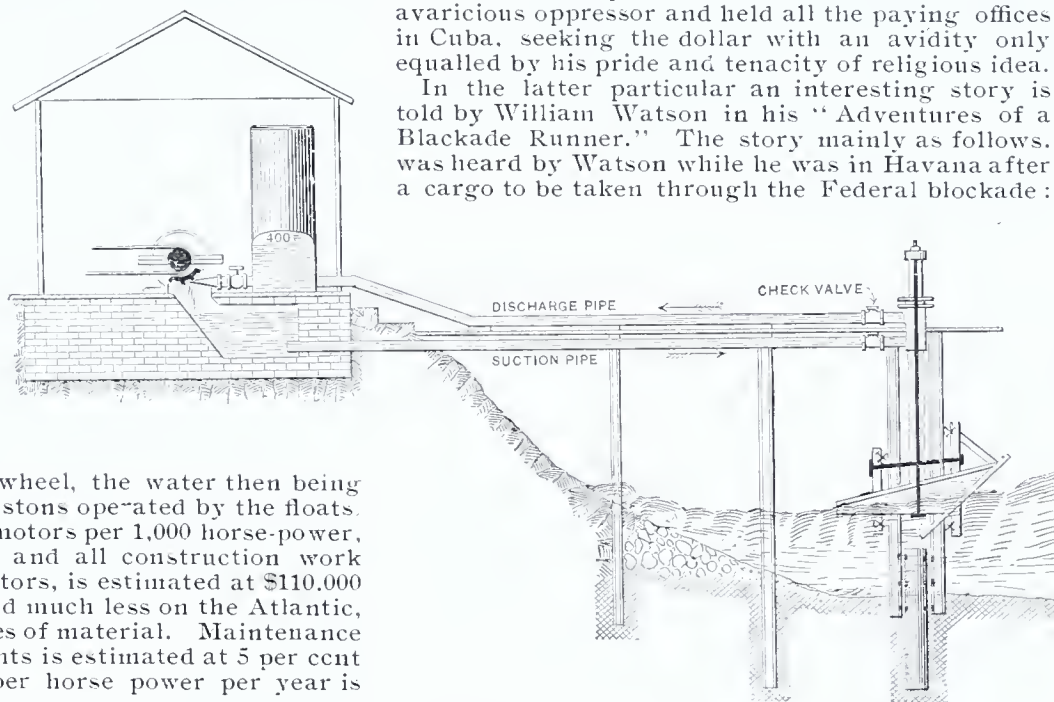
The construction is evident from the engravings. Large floats 10 by 10 feet constructed of planks or boiler iron, and loaded with cement to give a weight 25 per cent greater than the displacement, are connected direct to the piston of a water pump, and as the floats are securely fastened by rollers to a perpendicular iron frame work, they move only in a vertical plane actuated by the waves. The side of the float facing the incoming wave is inclined 30



THE WRIGHT WAVE MOTOR AT LOS ANGELES, CAL.

degrees, so as to utilize the force of the wave to lift the float. The waves give a piston travel of 12 feet per minute on the average. The maximum travel per wave being 8 feet, the minimum 6 inches, the average per wave being 3 feet. The waves average 3 to 5 per minute. The pistons operated by the floats have an area of 33 inches.

No power is taken when the floats rise, but their weight is utilized in the descent. This provides against any excessive pressure, as the floats will remain suspended when the pressure reaches 350 pounds. The descent of the float forces water through an ordinary check valve into a receiver until the desired pressure is obtained, and from this receiver the water is utilized at 200 to 400 pounds



pressure through the wheel, the water then being returned to the pump pistons operated by the floats. The first cost of these motors per 1,000 horse-power, including water wheel and all construction work without electric generators, is estimated at \$110,000 on the Pacific coast and much less on the Atlantic, owing to the lower prices of material. Maintenance and salary of attendants is estimated at 5 per cent and a royalty of \$5 per horse power per year is charged for the patent.

The promoters state that power at the seaboard will not cost more than \$13 per year, including 6 per cent on the investment.

Electric lights were merely to demonstrate steadiness of power.

Proportional variations were due to varying conditions under which motor was tried.

Variations in pressure were due to changes in weight of floats and size of nozzles, and amount of water pumped, etc.—Article and cuts from Power.

### Blockade and Prize.

The blockading of Spanish ports by United States naval vessels brings to mind that other and more extensive blockade of southern coast ports during our civil war when Uncle Sam found it more difficult to keep the blockade-runner from the enemy's

ports than has been the case in the Spanish-American trouble. But there is quite a difference in the means now employed for conducting a blockade, as compared to that adopted for keeping out the venturesome traders, upon which the southern confederacy relied so much for supplies. When this government now "sets down" before the ocean gates of an enemy's ports the guards employed are huge floating steel fortresses, armed with guns that send their projectiles through steel armor almost as easily as the old smooth bore cannon sent its cast iron shot into wooden hulls. In the civil war were used submarine and other kinds of torpedoes, including the automobile screw propeller variety. The latter could seek its victim

without being shown up by the powerful search lights now in use; and the submarine mine, although loaded with powder, was capable of sending a ship to bottom almost as quickly as the dynamite or gun cotton of the present.

As in the civil war, the American government has been conducting its Spanish port blockade in southern waters. And a strange coincidence in this connection is that Havana was one of the ports from which the confederates obtained not a small proportion of their foreign goods.

In those days the Spaniard was not slow to realize the advantage of trading with a people whose wants were many and means for gratifying them few and expensive. He was then as now, an avaricious oppressor and held all the paying offices in Cuba, seeking the dollar with an avidity only equalled by his pride and tenacity of religious idea.

In the latter particular an interesting story is told by William Watson in his "Adventures of a Blockade Runner." The story mainly as follows, was heard by Watson while he was in Havana after a cargo to be taken through the Federal blockade:

"Some three hundred years ago, when Spain held dominion over the greater part of the new world, and the city of Havana was rising up as a central station and key to these possessions, a magnificent cathedral was erected there, in just about the center of the town. This cathedral was said to be the finest in the new world, and was held in great veneration. When the Morro Castle and other defenses of Havana were taken by the British in 1762, the latter landed a force at Havana, a part of which was cavalry, and without any regard for the sacredness of the cathedral, they used the splendid edifice as a stable for their horses. When Havana was restored to Spain by the treaty of peace, signed in Paris in 1763, this cathedral, in consequence of the sacrilegious use to which it had been put by the British, was declared to be defiled and desecrated, entrance to it was strictly forbidden, and it was condemned to be closely shut up in

darkness for a hundred years.

When this period of time had expired the cathedral was again opened, but was never more used as a place of worship. It was employed as a custom house and for other purposes, being opened for secular business about the year 1862."

A part of the moral of this story is—that you cannot expect much progress out of a Spaniard.

As the neutrality law forbade direct trade with neutral foreign governments, the south's exports (principally cotton) and its imports, during the war went to and came from intermediate ports. The most important of these were Nassau, Bermuda, Matamoros and Havana. Among the ports sought by the blockade runner was that near the mouth of the Cape Fear River, in North Carolina, which, especially during the latter part of the war became the scene of much excitement and activity.

The writer knew a number of the pilots who served on blockade runners at that period, and is familiar with some interesting incidents connected with their hazardous business. Their work was hazardous not only on account of the danger of being killed by shot or shell from the Federal ships, or from drowning, when as was often the case, the pursued craft was beached to escape capture, but for the fact that the blockade-running pilot, after falling into the hands of the enemy was not set at liberty as were the others of the captured ship's crew—if she were a foreign trader—but was at once sent north to prison.

But the amount of money gotten by the pilot (nearly \$4,000) for each round trip, was sufficient inducement for almost any risk. If the ship got safely in he had a goodly sum—which in some cases was added to many times by like amounts; if captured money and liberty were both lost, and if run aground, he with the vessel's crew took to the small boats or swam for life, while the enemy's shot hastened their movements. Good fortune depended upon the ship's speed, the pilot's skill, and darkness. Yet in spite of all these, hundreds of vessels were destroyed or captured by the blockaders, and the property represented by ships and cargoes thus disposed of amounted to many millions of dollars. In fact, so effective was the blockade that, it is said, the exports of cotton to England fell off to such a degree, that in two years after the war began \$10,000,000 were distributed by English relief committees, owing to the closing of the Lancashire cotton-mills.

The blackading fleets consisting entirely of wooden ships did splendid service; and their officers and crews knew something of the "good fortunes of war." A number of admirals made from this source fortunes of at least \$100,000, and the commodores also made sea service in war time profitable. The writer knew of one of the latter, who died possessed of much riches, the bulk of which was prize money.

The sailors say that in dividing money thus gotten, it is poured through a ladder. That which lodges upon the spokes goes to Jack Tar, and the remainder to the officers. The division is not quite so one-sided as the sailor has stated, although the individual share of the latter is a very small sum as compared to the amounts gotten by the higher officers.

The rule in regard to prize money has heretofore been to give to the commander of a fleet or squadron, one-half of the value of prizes taken. If there was a division commander he received one-fiftieth of the spoil. The fleet captain, got a one-hundredth part, and the captain of a ship if under the command of a flag officer, had a right to one-tenth of the amount awarded to his vessel. If unattached to a fleet the latter officer drew three-twentieths. After the big fish had been given their shares of the prize money, the smaller officers and crew were rewarded in the ratio of their standing on the pay roll. Before money was paid out for a



captured ship matters concerning the latter must be taken before a prize court. After a vessel is captured a prize crew is put on board; her papers are put under seal and she is sent to the nearest port belonging to the captor's country. Her case is gone over by the admiralty court, her owners given a hearing, and, if they cannot make out a case in their own favor, the vessel is condemned and ordered to be sold. The court also decides the question of award—whether one-half or the whole of the proceeds of sale shall go to the captors, and the ships which shall share the prize money. It is the rule to allow equal share to all vessels that in any way assist in a capture.

There is now in the U. S. Treasury a large sum of prize-money, which has never been claimed by its rightful owners—consisting principally of sailors who served in the civil war. And after the present "unpleasantness" is over, the prize deposits will no doubt be largely added to.

Prize money is not paid for an enemy's ships

patent shall issue. If an applicant who filed his application prior to January 1, 1898, is unfortunate enough to be involved in an interference, which may tie up his application for an indefinite time, he may be obliged to forego obtaining patents abroad. If he files a single application abroad, and the foreign patent issues before he can obtain his United States patent, the term of his patent in this country is limited by the foreign patent. Now, an opponent in an interference proceeding, finding that the true inventor has taken patents abroad, though he may not be able to defeat the true inventor, may delay the issuance of the patent for years, and when the true inventor finally obtains his patent it is for a term which may be limited to but a few years.

"As to all applications filed on or after January 1, 1898, the opportunity for this is entirely wiped out by the act approved March 3, 1897. It is but fair and just for the United States to relieve present as well as future applicants from this hardship, and no opposition can be made to it except by those who

cutters it is cut into finished round sticks, each separate from the other, and each so nicely rounded that the meeting point of the two sets of cutters cannot be observed. After leaving the machine the finished sticks drop into a large box or hopper and are then stacked up ready for the flags. The machine is made so that it will cut any size of stick from the very smallest up to any diameter desired by simply changing the cutters on the cutting mandrels. The machine is arranged so that these cutters can be removed from the mandrels very readily and new cutters can be put in place in about a minute's time. The upper and lower cutters are placed in an almost vertical plane so that they will cut the sticks at almost the same time, and after the sticks leave the cutters they are fed into circular grooves before they leave the machine so that each separate stick is held firmly in place and a smooth cut insured. The machine cuts the sticks so smoothly and uniformly that sanding is not necessary. This machine can also be used for making all kinds of circular sticks for other uses. J. A. Fay & Company, of Cincinnati are the manufacturers of this machine.

#### The "Patent Office Bill."

That the important business of the patent office has for years been seriously interfered with by the continued refusal of congress to provide sufficient money and working force for proper conducting of patent affairs, has long been a well known and lamentable fact. For over ten years the office has been falling behind in its work, to the detriment of the inventor and the industrial world.

But, we are glad to say that the national legislative body has at last, in a measure, met the exigencies of the case by completing the passage on June 6 of the long waited for "Patent Office Bill."

This measure, although not all that was desired in the way of increasing the working force of the patent office, provides as additional assistance the employment of three principal examiners, two first assistant examiners, two second assistant examiners, six third assistant examiners, five fourth assistant examiners, four first class clerks, four copyists, six laborers, six assistant messengers, and six messenger boys. The appropriation for this purpose amounts to \$62,880.

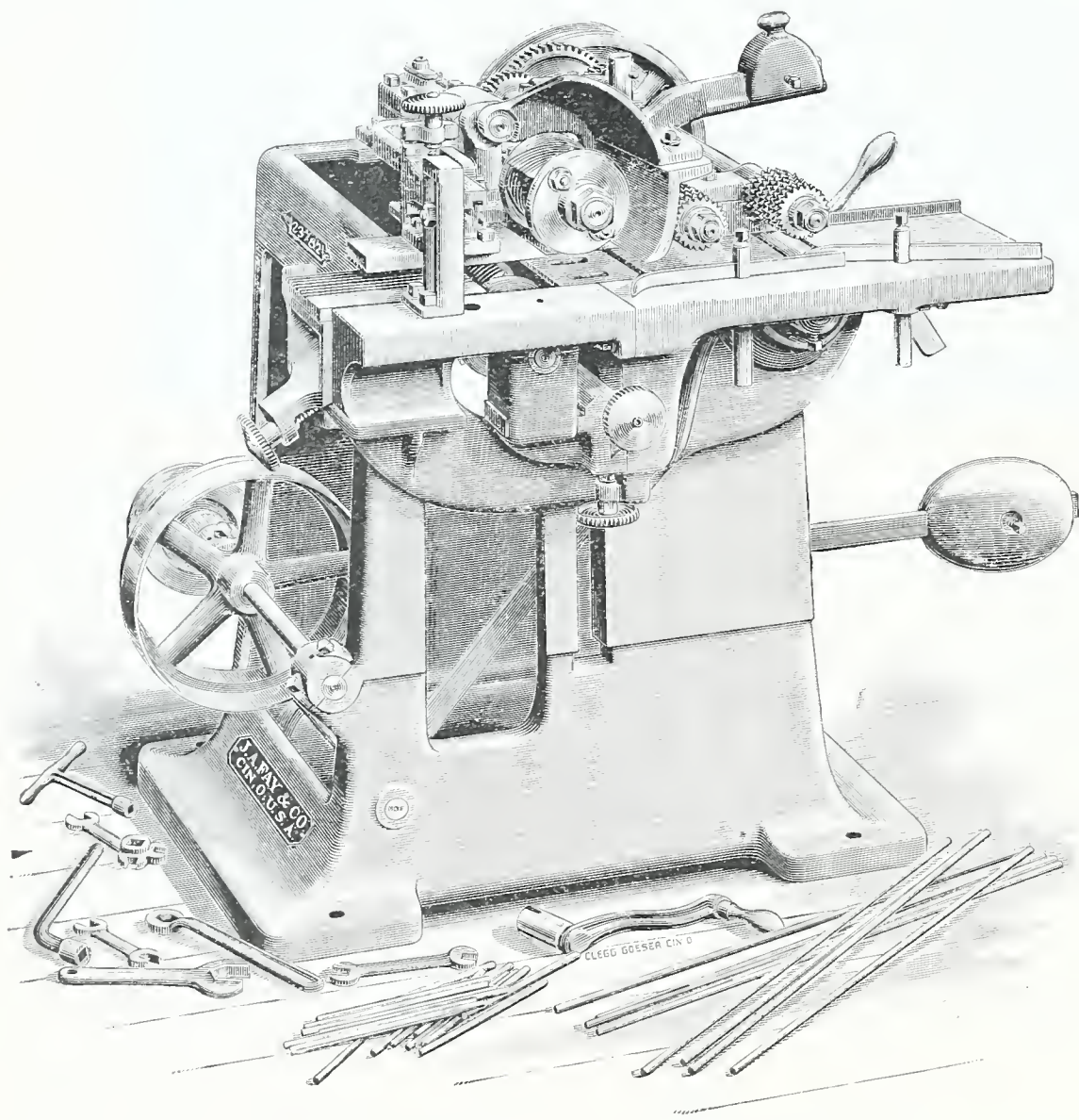
When it is known that the patent office brings an income to the treasury of \$225,000 a year in excess of its expenses, it is strange that adequate provision has not long before this been made for carrying on its work. This has been steadily on the increase, although in some years it has to a greater or less degree fallen off. This year the present war has had a diminishing effect upon the patent business, making it something less than that of the same time last year, and about as that of the year before.

Since 1886 there has been little increase in the examining force of the patent office. During that year the number was raised to 188, now the force is 200. In 1886 the number of applications for patents was 35,968. The work went on increasing, and in 1897 the applications amounted to 47,905. Up to the latter date the increase was about 33 per cent, while the increase in working force amounted to only 6 per cent.

It is needless to say that the passage of the "Patent Office Bill" is pleasing to Commissioner Duell and his able assistant, Mr. Greeley. By its provisions the work of the office, a great deal of which is seven months behind, can, after being brought up to date, be very nearly so kept. It has been thought that an increase of force would necessitate the removal of part of the patent office work to the Washington city post office building, but Mr. Greeley says that although the office space in the building may be a little crowded, all work will continue to be done in its present quarters. Sometime in the future, when the new city post office is ready for occupation and its employees moved there, the land office force will move into the vacated building. After this the employees of the patent office will have plenty of room.

The largest fund expended yearly by any country on behalf of its army is that of Russia.

Large bodies of men are better able to endure the fatigue of hard marches when not allowed alcohol.



AUTOMATIC MACHINE FOR MAKING FLAG STICKS.

destroyed by Uncle Sam's navy; but the government grants a bounty, which is divided among officers and crew of the victors, as is ordinary prize money. The victory at Manila should be a source of considerable wealth to those who won the battle, on account of the number of ships and men lost by the Spaniards. The law which governs this department of rewards gives to the successful fighters, \$200 for every officer and sailor on board the destroyed ship, if the latter was of greater force than her antagonist. If she was of less strength, then only \$100 per man is allowed.

#### American and Foreign Patents.

There has recently been reported by the committee on patents a bill (No. 7871) repealing the old section, No. 4887, of Revised Statutes. Owing to a mistake in phraseology of a bill offered in the fifty-fourth congress for the repeal of this statute the latter was left operative, although it is also in amended form of the statute book, making two sections of the same number.

This measure relates to the life of American patents, upon which subject we quote the committee report as follows:

"The limitation of the term of American patents by foreign patents is a great hardship. It was so recognized by the adoption of the amended section during the fifty-fourth congress. The applicant in this country cannot control the time when his

are seeking to defeat rights to patents by delaying their issuance through dilatory proceedings in interferences."

#### How Flag Sticks Are Made.

Many advances have lately been made in the construction of wood working machinery, which have been directed to the various fields covered by this industry, but none have been so radical and at the same time unique as the machine just invented for the quantitative manufacture of flag sticks. This is a direct result of the great patriotic movement that has swept the country and placed the American flag in the hands of every school child, and the almost universal display of the flag on every public occasion. The little sticks to which the flags are attached are consequently in great demand and by the old method of manufacture they could not be supplied in sufficient quantity. Under the old method each stick was rounded separately and the operation was very tedious and slow. By means of the new invention, we show in our illustration, the whole board is fed into the machine. These boards are first sawed into the length of the finished stick. There are two sets of cutters, one cutting on the top and the other on the bottom of the board. These cutters are especially shaped, the upper cutter cutting one-half the circle of the finished stick, the lower cutter cutting the other half, and this is done so nicely that when the board has passed the



## WEATHER OBSERVATIONS.

**Meteorological Instruments in their Relation to the Weather Map—A New Field for American Ingenuity**

The thousands of readers who daily scan the Star's weather map, either from motives of interest as to existing atmospheric conditions in various sections of the United States, or to make their own individual forecasts of coming weather changes, probably give very little thought to the complicated processes by which such a map is made possible. In respect to the construction of the original map, itself, as accomplished twice daily at the Weather Bureau in this city—this has already been fully explained in these columns, and the processes by which the regular government map 16 by 23 inches in size is reduced to 3 by 4 inches and adapted for printing on rapid cylinder presses are also familiar to those posted in modern newspaper work.

The extension and perfection of the electric telegraph at once made possible the collection of simultaneous meteorological reports in time to make them of value in the preparation of a weather map, but the compilation of the charts and the matter of their suitable reproduction have been the gradual result of a combination of scientific knowledge, experience, ingenuity and mechanical skill. But when all is said the entire value, in fact the very foundation upon which the map as a whole rests, is the accuracy and reliability of the meteorological instruments and apparatus necessary for the taking of the individual observations themselves.

That these observations are taken by skilled observers with the utmost care and accuracy goes without saying, but even this would not be possible were it not that each observer is supplied with complete sets of delicate meteorological instruments, the indications from which form the basis of the telegraphic reports. While, therefore, the foundation of the perfected weather map is the observations, the basis of these observations is the accurate apparatus.

Let us consider, therefore, some of these instruments, which are, as a class, much superior to those used by any other meteorological service in the world and represent the highest achievement that human ingenuity has yet attained in this particular line.

In the preparation of data for the weather map the elastic pressure of the air often confounded with the weight of the atmosphere, is considered as of the first importance. This is obtained from the barometer, the general principles of construction of which are well known, but the Weather Bureau instruments are constructed with more than ordinary care and skill and contain the latest improvements and adjustments. The mercury used in these barometers is washed in acid, dried, distilled in vacuum and filtered until it is absolutely pure and clean and will leave no trace of impurity on the whitest porcelain. It is finally boiled in the glass barometer tube until every particle of air is expelled. The top of the column is accurately read by the observer to the nearest hundredth of an inch; this reading is then corrected for temperature, for instrumental error (if any), and finally reduced to sea-level; the corrected result only is the portion enciphered and telegraphed. No aneroid barometers are used in making these observations as their indications are generally too unreliable for the accurate work of the Weather Bureau.

The temperature and humidity of the air are the next important items and these are obtained from thermometers which have all been carefully tested and compared at the Central Office with the standards of the Weather Bureau. These thermometers are purchased from well known regular manufacturers under yearly contracts, but the instruments are all made in accordance with strict rules and specifications. Each thermometer is critically examined and tested for every possible defect and none accepted by the government except those mechanically perfect and whose corrections for errors, as compared with the standards, are but a

fraction of a degree, Fahrenheit, at any part of the scale. Self-registering maximum and minimum thermometers are used to enable the observers to obtain the highest and lowest temperatures, and the current temperature at time of observation is taken from another instrument called the mercurial exposed thermometer. The humidity is obtained from two exposed mercurial thermometers, exactly alike, except that one has the bulb covered with muslin. These two thermometers are mounted upon a special whirling apparatus provided with suitable gearing by which the thermometers can be rapidly whirled through the air in a small circle to secure perfect ventilation. They are read immediately after whirling and the difference between the readings of the wet and dry thermometers, when applied to specially prepared tables gives the percentages of humidity of the air, and, at the same time the dew-point, or temperature of the air at which condensation of its moisture would take place.

The wind velocity is obtained from an instrument that records electrically and automatically in ink on suitably prepared forms moved by clock-work, each mile of wind movement as measured by the anemometer cups freely exposed to the air. The number of miles recorded in the 15 minutes immediately preceding the observation is multiplied by 4 and the product thus obtained is taken as the hourly velocity for that particular observation.

The direction from which the wind is blowing is continuously and automatically recorded for each minute of the twenty-four hours of the day. This instrument is called the "triple register" and a moment's inspection of the record gives the observer the desired information for the telegraphic reports. This triple register is an exceedingly important and ingenious instrument. As the name "triple" implies it records automatically the three principle weather elements: wind (velocity and direction), sunshine and rainfall.

For the telegraphic reports information in respect to sunshine is combined with that for the "state of the weather," which is obtained from a critical eye observation of the entire heavens from horizon to zenith, the various kinds of clouds (or absence thereof) being recorded on a scale of 0 to 10 in suitable characters, and the whole is completely enciphered as to kind, amount and direction of motion in one or two simple code words. The instrumental record of sunshine, however, as made by the ingenious photographic or electrical apparatus, gives practically a continuous record of the "state of the weather," for the hours of sunlight. In this connection we might also mention another instrument (but which has not yet come into general use) for recording cloudiness at night time. This is called the "Pole Star Recorder." It photographs the North Star continuously during hours between sunset and sunrise; any break in the record line indicating the presence of clouds.

Rainfall is observed and recorded to the nearest hundredth of an inch and an inspection of the record sheets of the registers of the recording gauges shows the total amount of rainfall in the preceding 12 or 24 hours, which total is the amount telegraphed.

We thus observe the important part which instruments perform in this exacting work. Nearly all these special meteorological instruments are the result of American skill and ingenuity, but the thermographs and barographs (automatic instruments for continuously recording temperature and barometric pressure) of the French pattern have been adopted in the United States on account of their cheapness and portability.

The great desideratum in the preparation of a synchronous chart or map of weather conditions is to have all observations taken under (or reduced to) the same conditions of exposure as near as possible. Of the 120 regular telegraphic reporting stations of the Weather Bureau, those located in the larger cities are at the greatest disadvantage, for, to secure even fairly satisfactory exposures there for delicate meteorological instruments it is generally necessary to place them on some high building.

Even then the wind instruments must be elevated above any towers, ventilators, etc., in the immediate vicinity; thermometers and thermographs must be placed away from the influences of chimneys, smokestacks, etc., and elevated so as to be unaffected by reflected heat from tin roofs; and special corrections ought to be applied to the decreased "catch" of precipitation which falls on such exposed and elevated structures.

The observations of the Weather Bureau, in cities especially, are, therefore, frequently criticized as not accurately indicating the conditions on streets and pavements where the majority of people have to exist. But when it is realized that these observations are necessary for a National Weather Service in the preparation of a general weather map of the entire country, it will be seen that the strictly local conditions prevailing at some particularly exposed or protected locality, such as a street corner or an inclosed court, should not be considered in this work. In fact, the areas of land covered by all the cities of the United States would aggregate but a very small portion of the area of the entire country, and therefore the conditions which obtain in the free open air of the country are really the general prevailing conditions of the atmosphere and should alone be considered in climatic studies or the preparation of weather maps.

Every effort is made, however, to have the exposures of the various instruments as uniform as possible at the various stations of the Weather Bureau. The barometers and barographs are protected from the direct rays of the sun and from extremes of heat and cold; thermometers and thermographs are screened from the sun and rain in specially constructed lattice-work shelters, elevated above surrounding objects; anemometers and wind vanes are placed on high supports to be away from the influence of towers, gables, etc.; rain and snow gauges are so located as to be the least affected by eddies or currents of air which might increase or diminish the amount collected.

That this careful attention to details of exposure and the perfection of instrumental equipment has given excellent results is proven by the constantly increasing reliance that the public places upon the observations and maps of the Weather Bureau. The records from automatic meteorological instruments are frequently required in courts of law, and cases involving many thousands of dollars are annually decided on the one point as to the conditions of wind or weather which really existed. The scientific accuracy of any special work in which the use of instruments is involved cannot rise above the mechanical accuracy of the instruments themselves. It is essential, therefore, that our meteorological instruments should receive special attention, and, while the delicate and ingenious instruments now used by the Weather Bureau are the very best of their kind, yet there is always room for improvement, and there is a field here for inventive American skill that has received but little general attention. On account of the very limited demand for special meteorological apparatus of any kind, however, the would-be inventor must not expect to reap large financial rewards for his labors, but if successful in producing something new and useful in meteorological work he should be content with a patriotic feeling that he has added to the advancement of science generally and the perfection of the American meteorological service in particular.—*Washington Star*.

A railway between England and France on rails submerged to a depth of fifty feet below low-water mark has been seriously proposed, according to the London "Electrician." The vehicles are to consist of platforms raised above the surface of the water, on which platforms on through trains could be secured as they are upon car ferries. This is similar to the road built at the English seaside resort, Brighton.

More than 40 per cent of the British people could not write their names when the Queen ascended the throne. The proportion in that condition has now been reduced to 7 per cent.



# NEW INVENTIONS.

## Electric Safe Protector.

Isaac Flead, of Harrisburg, Pa., has been granted a patent for an electric apparatus for the protection of safes. This is on the alarm plan and comprises a safe provided with contact-points, an electric conductor, magnet-armature, switches, battery and alarm box, a bell, and suitable wire connections for transmitting the alarm when the safe door is opened by the unwelcome prowler. The burglar opens the safe door, and thereby calls the watchman to arrest him.

## Bicycle Handle-bar.

An improvement in handle-bars for bicycles has been invented and patented by Orin B. Mosher, of Joilet, Ill. In this the handle-bar is movable, so that its ends can be made to assume any desired elevation suitable to the rider. It is pivotally attached to the steering-head, upon which a clamping-nut is mounted to interlock therewith, and to firmly secure the handle-bar when the rider has determined the body position to be assumed. This invention has good points, and will no doubt find favor.

## Electric Lighting for Railway Cars.

Willard F. Richards, of Buffalo, N. Y., is the inventor and patentee of an apparatus for furnishing railway cars with electricity for illuminating purposes. This comprises the usual dynamo outfit, which is placed beneath the car, and connects by wire with the lamps in the carriage. Power for operating is obtained from the car-wheel around the axle of which passes a band, which in turn engages the axle of the dynamo. The latter is suspended from the car body in such a manner that it can move forward when the speed of the train increases the revolutions of the dynamo beyond the required rate, and thus slack the power supply band, thereby causing a falling off in and an equalization of dynamo speed.

## Bayonet Machine.

The war has caused the bringing out of quite a number of patents relating to killing apparatus, some for use at sea; others to be employed by and against soldiers. Among the latter class is a war machine invented and patented by Adolph J. Johnson, of Minneapolis, Minn. The machine is operated by horse-power, and consists mainly of bayonet and sword-carrying devices supported upon four wheels. The two forward of these are traction wheels, and from their axle projects forward a frame at the outer end of which a series of bayonets are arranged horizontally, being supplemented with a series of depending swords. The outer end of the frame is attached to a pole, which can be raised or lowered by means of a cable running over a guide at the top of a mast, enabling the cutting and stabbing apparatus to be held at any desired elevation. There is also a sprocket and chain-driving arrangement whereby the weapon-holding frame can be made to move backward and forward when pushed against the close ranks of an enemy. The motive power (four horses) is placed in the frame, in front of the traction wheels, and when this beligerent mowing machine is ready for business, it is only necessary to apply the whip, prod the enemy, and toss his spitted body in the air.

## Tombstone.

John B. Ford, of Creighton, Pa., has been given a patent for an improvement in tombstones, in which there is embraced beauty and economy. This tombstone is to be made of porcelain, being hollow, and having on one of its faces an aperture for the insertion of a plate bearing the name, etc., of deceased. The hollow portion of the tombstone is to be filled with concrete.

## Submarine Boat.

One of the late inventions pertaining to war is that of George W. Bennum, of Georgetown, Del. This is a submarine vessel, which, while having a resemblance in outward shape to most under-water crafts, differs in construction from those that have laid claim to public attention and government recognition.

The peculiar feature of this invention lies in the manner of arranging the boat's propellers. Pockets are formed in the boat's sides in which shafts are vertically journaled; shanks are secured to the shafts, and fin propeller blades are

hinged to the shanks so as to swing vertically. In connection with the shaft there are pawls, ratchet wheels, gear-teeth, a crank-shaft, etc. The latter is journaled in the boat, is operated by suitable power, and is connected to the first mentioned shafts by pitmen. So it will be seen that if this new invention gives us another submarine boat her power will be furnished by side propellers.

## Nursery Bottle Holder.

Joshua W. Sykes, of Detroit, Mich., has been given a patent for a holder for nursery bottles, by which means the youngster, if not too small, can feed himself conveniently. In accomplishing this a bracket is fastened to the head of the bedstead or crib, with its arm extending lengthwise over the bed. From the bracket a spiral spring or other flexible support hangs downward, and to this the feeding-bottle, having an encircling band of metal, is attached. When the little one gets hungry it has only to reach up, grasp the bottle and insert the nipple. After being satisfied, the food supply, upon being let go, swings out of harm's way, and is kept from being lost in the bed-clothes.

## Linotype and Matrix.

An invention in the way of linotypes and matrices has been made and recently patented by Geo. E. Lincoln, of Brooklyn, N. Y. This comprises principally a form composed of a series of parallel slugs or linotypes, each having a column of figures one under the other, whereby figures of one slug are adapted to read in connection with those on the next; and a series of matrices having their characters located in line with each other and arranged to be read lengthwise of the matrices, whereby they are adapted to form a series of characters transversely of the edge of a linotype.

## Gas-vender.

Charles P. Mayer and John H. Pomeroy, of New Haven, Conn., have been granted a patent for a gas-vending machine, which, if it works satisfactorily, should be welcomed by the users of lighting and cooking gas. The machine is coin-controlled, with not a little mechanism in its automatic make-up. By its use one should get just the amount of gas required for cooking a meal, heating or illuminating for a certain amount of time, by dropping into the machine's slot a small coin. The adoption of a good vending apparatus of this kind would do away with the uncertain gas meter; and the user would get what he paid for—no more, nor less.

## Lamp-burner.

The overheating of lamp-burners has always been a matter of much concern to housekeepers, on account of the danger from explosion, which sometimes happens when gas has been generated in the lamp by too much heat. To prevent this, Lucian R. Oakes, of Bloomington, Ind., has invented and patented a lamp-burner, which, it seems, is an improvement on the kind now in use. In this the burner is surrounded by a water-jacket, which gets its supply of cooling liquid from a small reservoir attached to one side of and also connected by a feed-pipe to the jacket.

## Electric Brush.

An electric flesh brush is an invention recently patented by Emma M. Hellwig, of Chicago, Ill. This brush has a cavity in its upper body portion, in which is a battery, that with suitable attachments, supply current to the bristles when the latter are applied to human cuticle.

## Motor-operated Cradle.

It is strange that, since the baby-industry is so old, no one has made for the infant an automatically-rocked cradle. But the 19th century, so remarkable for its inventions, has, by the genius of Carl F. Nilson, of Giles, Wis., produced a self-rocking infant soother. The cradle is mounted upon four wheels, and is nicely balanced by being attached at its ends to uprights by means of trunnions or journals. At the rear end is a boxed portion containing a clock-work motor. So when baby is to be put to sleep in the clock-motor cradle, the crank-handle of the motor is turned, winding up the machine, which proceeds to put the infant into the land of dreams.

## Preventing Car-derailment.

Maria E. Beasley, of Chicago, Ill, is the inventor and patentee of a device for keeping railway cars from jumping from the track. A second set of rails is used for this purpose, in connection with a truck

from each end of the cross piece of which depends a bar having its end bent squarely forward, so that its lower end extends under the flange of the guard-rail. There is great need of something that will prevent the derailment of trains; and an invention that will do this, will be a public blessing.

## Combined Pack and Sled.

Those who contemplate going to the Klondike will be interested in the recently patented invention of John E. Erb, of Livingston, Mont. This comprises a combined pack and sled, to be used with dogs attached in harness or to be carried on the traveler's back. It is of rectangular shape, having a toboggan bottom and close top. Around the latter is a rod railing, and in the central portion are apertures through which food, clothing, etc., are put into the vehicle. The apertures are covered with miner's prospecting pans.

## Painting Outfit.

The invention of Charles F. Spencer, of Alexandria Bay, N. Y., should be of interest to painters, since it concerns their business. This idea, recently patented, represents a paint pot, hook and brush holder, which consists of two half-round oblong pots held one above the other, by a single bent wire rod, the upper end of which forms a hook for engaging the rings of a ladder. The whole arrangement is very complete and convenient.

## Electric Car Line.

A patent has been issued to Joe H. Cooley of Paris, Tex., for an elevated electric car road, in which is employed a single bed-rail and two overhead rails for each track. The design is for a double track laid upon cross ties which are supported by beams running lengthwise the road and held upon transverse iron frames one of which is secured to each main supporting post. The overhead rails, for balancing the car, are also held by the transverse frames, as are the electric-supply wire. The single bed-rail fits into the groove of the car wheel, which occupies a central position under the car.

## Marine Table.

Among the many things for comfort on shipboard is one invented and patented by John H. Laskey, of Boston, Mass. This is a table, by the use of which dishes and food are kept from being thrown into the lap of those taking their meals when the sea is on the rampage. The table is supported by an upright, which also supports the platform upon which are secured seats. The upright is fulcrumed to a circular base attached to the cabin floor, and so adjusted that the table and platform oscillate with every motion of the ship, and so preserves its equilibrium.

## Suggestions to Patent Examiners.

James Bennett Forsyth, general manager of the Boston Belting Co., and a member of the National Association of Manufacturers, submits the following suggestion for the consideration of the president of the Association and all others interested in patent matters:

There is one point which I desire to call to the attention of the commissioner of patents and patent laws, which possibly may not have been brought up before. It is that some provision be made, or that the patent examiners be authorized, to inquire from representative individuals, or manufacturers in any industry, of the state of the art connected with that industry, when investigations are being made to determine the novelty of inventions for which applications for letters patent may be filed in the patent office.

While the patent examiners are usually well informed, yet it is almost impossible for them to have on file accurate and recent information covering all branches of industry. It sometimes happens that patents are granted for ideas which are not by any means new, and if the patent examiners were permitted to make inquiry outside of the patent office it seems to me that this objectionable feature our patent business would to a certain extent be overcome.

They could formulate their inquiries in such a way as not to reveal the exact information which they might be desirous of obtaining.

I simply submit this suggestion for your consideration, and the consideration of the committee on patents and patent laws if you think it worth while to bring it to their attention.

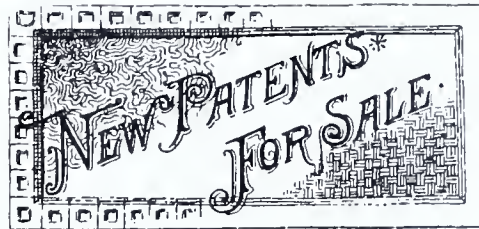
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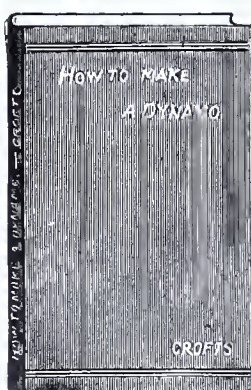
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In addition to this number of air compressors furnished for domestic use, four were exported to Europe for operating pneumatic shop plants.

Among the orders of especial interest included in the above summary, may be mentioned the plant installed at the navy yard, Brooklyn, New York, for supplying pneumatic drills, paint machines and hammers, and one furnished to the Yarrow Ship Yard, London, for operating pneumatic tools. Another installation of interest is the compressor at the Dunn Building, New York, which supplies compressed air dusting nozzles for cleaning the iron grill work of the elevator shafts.

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### Change of Location.

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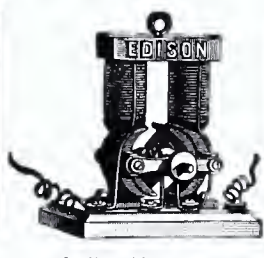
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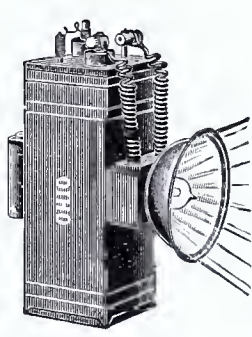
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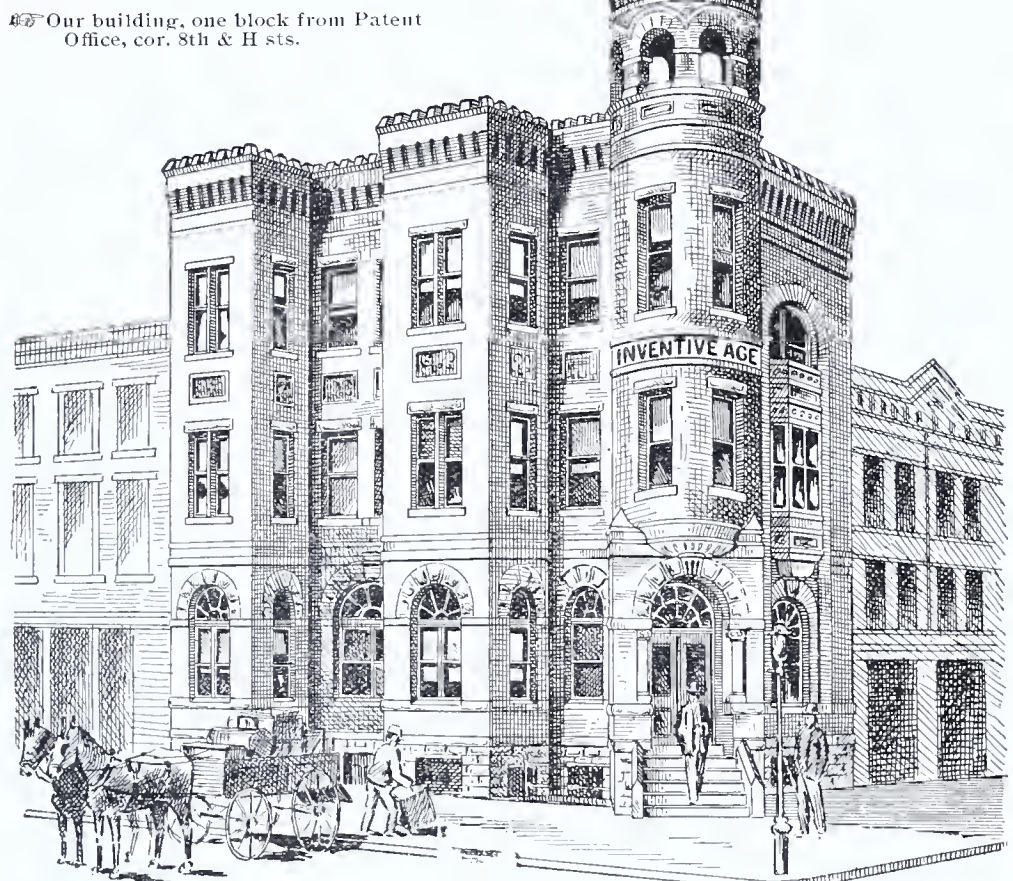
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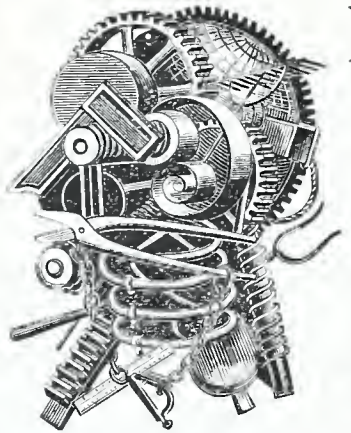
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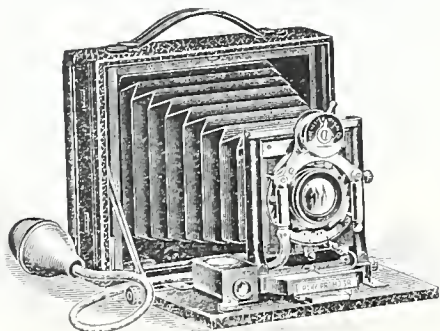
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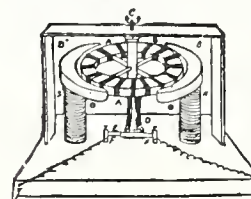
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### THE GIBRALTAR OF THE PACIFIC.

If we could get a consensus of opinion from the legislators of old who have joined the great majority across the line of life, and who are held up to us as examples of national conservatism in regard to the territorial expansion of the United States, there is little doubt in the mind of the writer, that the spirit host led by the immortal George, would cast a "solid vote" in favor of conferring the blessings and honor of American citizenship upon the greater portion of mankind, and taking into our progressive fold whatever landed possessions the Fates should offer.

Should there be a stopping point to the expansion of the country with the best government on earth? We think not—not so long as the better interest of humanity can be served. If after our independence as a people had been secured from Great Britain, we had been content with the size of our possessions, we would have cut but a small figure among the nations of the earth.

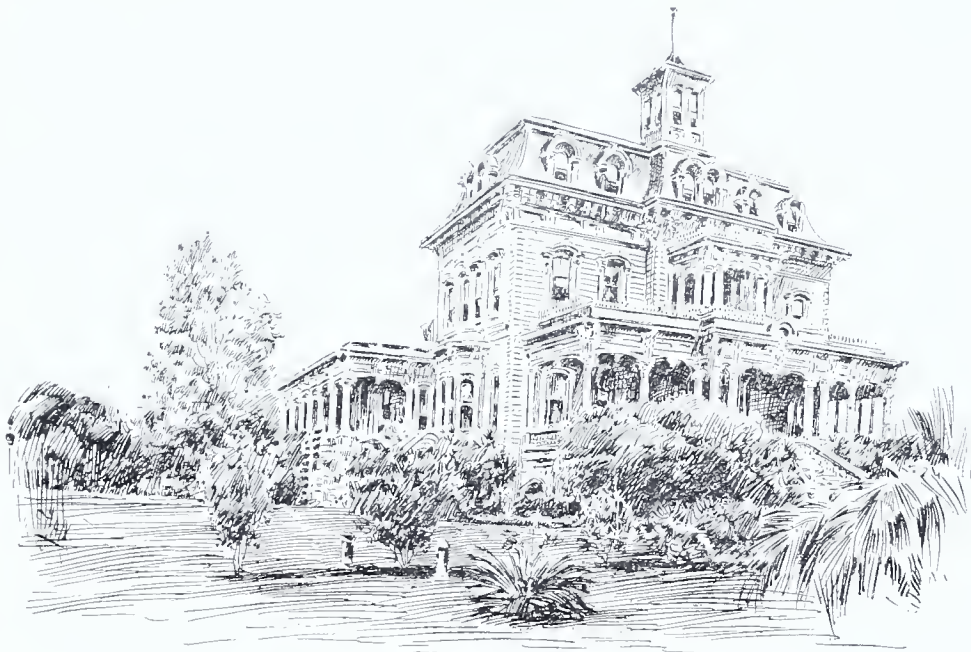
As it was we began very early to enlarge our national domain, and at small expense; buying from Napoleon 1, for \$15,000,000, the magnificent empire, stretching from Florida to the almost extreme northwest; from Mexico (from the California conquest) a vast area of territory for \$15,000,000; the Gadsden Purchase, for \$10,000,000, and other valuable property at comparatively small cost.

And then at a more recent period came the acquisition of the new Eldorado (Alaska) which was

when Kamshameha I, made war on the other chiefs, and made himself the sole ruler of the Sandwich Islands. It was the United States marines who protected King Kalana, upon his election to the throne, when the followers of Queen Emma, his

feet, with perpetual snow on the island of Hawaii. The country is of volcanic origin, and there are hundreds of extinct and two active volcanos. Beautiful valleys, gorges and rolling plains lie between the rugged mountains, and along the coast are

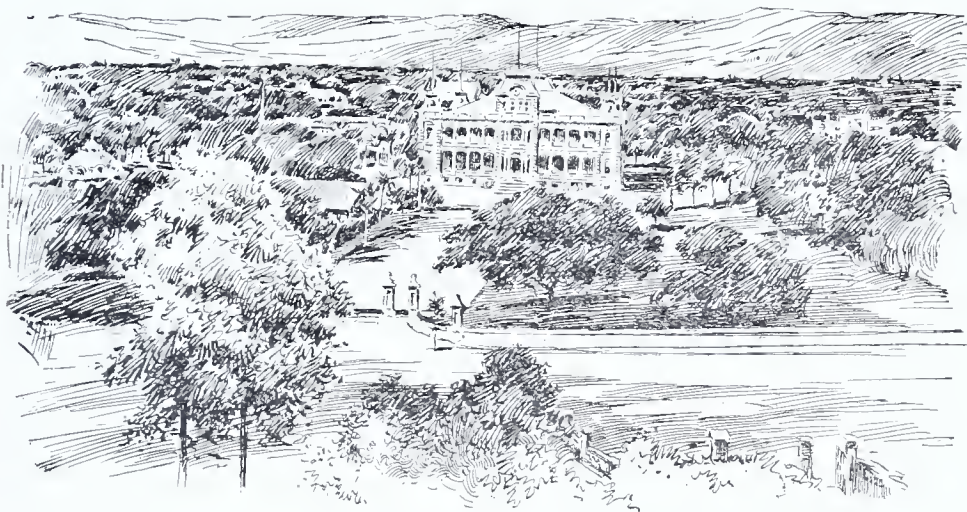
reefs of coral and towering precipices that lift their crests thousands of feet above the Pacific's blue water. The fertile soil consists of decomposed lava and in some places requires irrigating. The water is obtained from artesian and surface wells and from mountain streams. The area of public lands is 1,740,000 acres estimated in 1894 at a value of \$4,389,550. The income from rents from this source in 1896 was \$137,773. A large piece of this land is mountainous and unavailable, and much that is available is under lease. The report of the Senate Committee on Foreign Relations, to which the writer is indebted for much information contained herein, gives the population of the Hawaiian Islands, as 109,020. Of this 31,000 are



PUBLIC SCHOOL HOUSE—HAWAII.

defeated opponent, raised an insurrection. And it has been to our government, more than to any other that the people of Hawaii in the past have looked for advice and help when such was needed. On three occasions the ownership of the islands was offered to us, and not until the fourth offer (by the Dole government) was this valuable

native Hawaiians; 24,400 Japanese; 15,100 Portuguese; 21,600 Chinese; 8,400 part Hawaiian and part foreign blood; 3,000 Americans; 2,200 British; 1,400 Germans; 479 Norwegian and French, and 1,055 of other nationalities. The chief Hawaiian city, Honolulu, located on a small harbor, has a population of 30,000. The buildings in the city are of stone, brick and wood, the residences being composed of the latter material. There are 67 miles of streets and drives, 20 miles of which are macadamized; and street railway, electric light and tele-



STATE HOUSE—HAWAII.

gotten from Russia for the comparatively small sum of \$7,200,000, and which—like California—after it became ours, yielded the secret of its golden store, and more than justified the outlay for its purchase. It is a golden monument to the wisdom and foresight of those who advocated and worked for its acquirement, as well be the "Gibraltar of the Pacific," Hawaii.

The latter comes to us as comes the dew from the sky—a free gift, and one worthy of acceptance. And it is right that these fair islands should belong to the United States; for long years ago, when the savage idolater ruled them the American missionary began their civilization and carried on the work of regeneration and progress that made possible their present status in the intelligent and the commercial world. It was by the help of John Young, an American sailor, who with fourteen other sailors commanded and worked the guns

gift accepted. So it was the manifest destiny of the Hawaiian Islands to become a part of the United States, bringing a large territorial area and immense productive possibilities. Sugar, coffee, rice, and a great variety of tropical fruits are among their products; manufacturing can be carried on there with profit, and as health resorts—with a climate of a maximum of 82 degrees in summer and 74 in winter—there is little to be desired. The islands are all high and mountainous, rising to a height of 4,000 feet on Oahu, to 10,000 on Maui, and 14,000



AN AVENUE OF PALMS—HAWAII.

phone systems. The city has handsome executive buildings, court house, custom house, banks, (Continued on page 96.)





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WASHINGTON—NEW YORK, JULY, 1898.

THERE are twenty-four women employed in this country as inspectors of factories. The work is in New York, Illinois, Pennsylvania and Rhode Island.

SO FAR we have whipped the Spaniard on land and on sea (on the latter annihilated his fleet); we have captured his ships, men and territory. The superiority of the American navy and army has been demonstrated; and it remains now to complete the glorious work so well begun, and to add to our magnificent domain much of that which has been so badly ruled by Spain.

But what has given us the victory? What has caused us to be the envied of nations? The wealth of our great country and the bravery of its people in part have done this. But the product of inventive genius—ships, guns, and the various apparatus, by which war is conducted upon a scientific basis—has played a most important part in the success at arms which has been ours. The United States is the most scientific of all nations, and the product of her factories for war—especially at sea—is the best that money and skill can obtain.

**The Nicaragua Canal.**

It is to be hoped that when Congress again assembles, it will at an early date take up the Nicaragua Canal matter. This is something of important national interest, which deals with our great commercial affairs and with the principle of protection when war claims our belligerent attention. The completion of the Nicaragua Canal would reduce the distance between the Atlantic and Pacific coasts by water, to about one-third of what it is now. It would reduce the danger and time of a long sea trip and necessarily makes a great difference in the expense of such trips.

It is stated by competent authority that the expense of constructing the canal would be about \$125,000,000. This is a large sum, but we believe the people of this country, who by this time understand the value of the Nicaragua Canal, will be willing to give this amount—and more it necessarily—for the purpose.

**The Visiting Educators.**

The National Educational Association, which recently met in this city was largely attended by representative educators of both sexes from all parts of the country, and by thousands of teachers, who availed themselves of the splendid opportunity to participate in the feast of knowledge that was so bounteously spread before them. They also had the opportunity for becoming acquainted with the many things of interest in the Capital City, and took away with them much information that no

doubt will be of value in "teaching the young idea how to shoot." Washington is becoming more and more an educational center. People of culture and learning appreciate more than ever before its advantages in this respect; and in time Boston and New York will have to yield the "palm of knowledge" to the capital of the nation. In its libraries, schools, scientific institutions, and in Congress, Washington affords educational advantages that cannot be too highly appreciated.

**The Faulty Bulkhead.**

The ease with which a great sea-going vessel is sunk, is not a small reflection upon the method of modern ship architecture. The sinking of the *Bourgogne* brings this forcibly to mind, and suggests in its awful lesson some pertinent facts:

The *Bourgogne*, like some other modern ships, which have met a like fate, was built with compartments, which were divided in halves by a central partition running from stem to stern. When she was struck, and her compartment stove in, the in-rushing water being unable to occupy both sides of the compartment, and therefore keep the ship upright, caused her to keel over and sink much more rapidly than if the broken compartment had not been divided.

The heeling of the ship also caused the water to rush in through the upper row of gangways and portholes, and thereby facilitate the sinking and the awful destruction of life that followed.

This manner of dividing ships into compartments apparently should be changed, for instead of being a safeguard against disaster it but helps it on.

**Theodore R. Trimby Invented the Monitor.**

It is constant with the justice and broad-minded disposition of the American people to give credit where it is due. This is exemplified in a recent article in the N. Y. Herald, which brings out the facts in connection with the invention of the Monitor. This great feat of inventive genius has been given to John Merrickson, who died in possession of this honor. But in the Herald's article the monitor idea, with its revolving turret, which caused such a revolution in marine warfare, is attributed to the genius of Theodore R. Trimby, of New York.

In 1848 Mr. Trimby brought his invention to Washington and tried to interest Senators and other public men in it. Among these was Jefferson Davis, who advised the inventor to put off patenting his invention until a time of war. It seems that the monitor was not patented by Trimby;—a great mistake—and that his idea was used by Ericson, the builder of the new terror of the sea. It is a strange coincidence that the Monitor, which Jefferson Davis did not think it sensible to patent before a war should furnish cause for its employment, was used with such disastrous effect against Mr. Davis' government.

Since the introduction of the Monitor as a fighting machine, the progress of naval architecture has been comparatively rapid; and today, as shown in the Spanish-American "unpleasantness," is the best of its kind afloat.

**The War Congress.**

Not since the days when Congress sat and considered the affairs of the nation during the Civil War, has so important a session of the national legislature been held than that just closed.

This body was in session a little over seven months, and during that time appropriated more than \$900,000,000. Of this \$360,000,000 were for war purposes and \$20,000,000 for warships to be built. The most important resolutions were of course the declaration of war against Spain, and the annexation of the Hawaiian Islands to the United States.

The amount given for the increase of the navy was an essential feature of the congressional proceedings, which will go far towards that point which some day in the not very distant future, will find our power-afloat superior in all qualities that concern the perfect fighting ship, if we are not

equal in numbers to the navy of the most powerful marine force in the world. In the way of money, the army has received at the hands of Congress, all necessary sinews for finishing, its belligerent "contract," i. e., "finishing the Spaniard."

We thank our legislators for meeting the demands of the situation in a generous manner. But we hope that if it ever becomes necessary for Uncle Sam to again take up arms, he will have more guns—small and large—and more of them on hand for the purpose required. There is much room for improvement in the small arm used by this government, and there is a good opportunity for the American inventor to exercise his genius in this very important particular.

**Rear Admiral Daniel Ammen, U. S. N.**

In the death Rear Admiral Daniel Ammen, which occurred on July 11, at Washington, the country not only loses a brave man who served his country well in the American Civil War, but also has taken from the ranks of American inventors one who has helped to push along the wheel of human progress and scientific effort.

Admiral Ammen was born in Brown County, Ohio, in 1820, and therefore was at the time of his death about seventy-eight years old. At the age of sixteen he entered the U. S. Navy as a midshipman and for five years saw more salt water than anything else. In 1842 he passed the examination at the Naval Asylum at Philadelphia and was rated as past midshipman and eligible for a lieutenancy. The latter promotion came to him seven years later, after which he felt himself fairly launched in his chosen career.

The Civil War found Lieutenant Ammen ready for the combat, and the southern coast was the scene of his employment. While on this duty—with Admiral Duport—on April 7th, 1863, he (Ammen) had an important experience as to the offensive capabilities of the monitors employed in his fleet. The latter on the above date sailed into Charleston harbor and began battle with the forts. In less than two hours some thing over two thousand shot and shell were thrown at the ships, while the latter discharged only one hundred thirty-nine. Five of the monitors were more or less disabled and the fleet found it necessary to withdraw.

And through the civil strife Ammen went, being at the battle of Fort Fisher, which occurred near the end of the war. After the latter, he had command of the flag-ship *Piscataqua* and was sent to the Asiatic station. From there he came to Washington, where he served the Government in several capacities connected with the Navy Department.

Many articles in favor of the Nicaraguan canal project have been written by Admiral Ammen; and to his inventive genius are due improvements in Lord Kelvin's deep-sea sounding apparatus, in which is used piano wire; the balsa, or life-saving raft adopted by the United States many years ago, is his invention, and the world-famous ram *Katahdin*, was the offspring of his inventive idea. This ship was comparatively recently commissioned or service, and while not having shown the speed expected of her, is nevertheless a formidable warship capable of excellent work. It took Admiral Ammen many years to get the Naval Advisory Board to recommend his plans for a fighting ram; and after the Board had advised the building of five of these ships, Congress appropriated money for only one, the *Katahdin*.

Since the naval war with the Barbary pirates at the beginning of the century, the arms of this country have never been engaged at any considerable distance from our own shores. The case of the Manila expedition it will be most interesting to observe the manner in which our officers attack the numerous and serious problems which confront the leaders of armies of occupation and expeditionary forces operating far from a base of supplies.



### Shot and Shell in Battle.

The nation that in future contemplates going into war may well carefully count the cost in money that such a proceeding may amount to. In army stores and equipment, and in naval vessels and their outfit, the expense of war is always enormous. Ships and armies can be kept for future armed contests (what is left of them) after a war; but stores, powder, bullets, shot, shell and other matter expended is "dead waste." This is literally true of shot and shell that does not find the target.

Of the discharged metal it is of interest to note the number of shells etc., thrown at the Spaniards by the U. S. battleship Oregon. While engaged with the Cristobal Colon, the Oregon fired at the doomed ship 1776 shot. Of these 1670 were six-pounder shot. The 13-inch guns discharged 34 shells, the 8-inch guns 28, and the 6-inch cannon 24. The 1-pounders were discharged twenty times.

If the other U. S. ships in the fight at Santiago fired as many shot as the Oregon, the aggregate would be over 10,000. Of these only a comparatively small percentage did execution; the balance went into the sea—to be charged to the "marine sinking fund." The Spaniard was soon put *hors de combat*, by this rain of metal; but it took tons and tons of it to do the work.

Suppose one-half of these shot had struck the Spanish ships. In such case there would have been nothing of them left except piles of debris at the ocean's bottom; there would have been no spoils of war taken and not a single prisoner.

So, from a humanitarian standpoint it is better to throw away many shot and thereby save life—and incidentally, valuable property. But if a gun is shot to hit its target, would it not be better to hit it more frequently before bragging so much about expert gunnery.

As the old sailor at Manila, said, the Spanish gunners could not hit a "flock of barns;" and there is no doubt that the American gunner is the best of his kind afloat. But it seems that out of such a vast number of shot discharged by our fleet in the great battle off Santiago, more of them ought to have been effective. It may be said that the ships were going at full speed during the battle. This is true. But before the war, ships of the American navy while at target practice, had little difficulty in striking the mark, while going at high speed.

But the glorious victory was won by our side; and we say "All honor to the brave victors."

### Speed of Modern Projectiles.

Something concerning the speed and trajectory of modern projectiles may be of interest at this time. The bullet of the small arm goes forth after a possible victim, at the average speed of a mile in three seconds; and the projectile from heavy ordnance cleaves the air at a velocity of from 1,500 to 3,000 feet per second. The speed of a shell from the *New York's* larger guns is 2,100 feet per second.

To the casual observer, it would seem impossible to accurately determine the velocity of a cannon shot, but science has reduced this work to a certainty.

There is a rotational velocity of a shell given by the spiral rifling in the gun, which causes it (the shell) to bore through the air; but this, while important, is not of so much interest as the destructive forward speed which drives the destroyer to its work.

The following description of determining the velocity of a shell and its trajectory, which we take from the N. Y. Herald, is of much interest:

"Two screens, so closely strung with copper wire that the projectile in passing through must break one or more of the strands, are placed fifty yards apart. The wire on each screen is connected with a battery which sends a current through it, and two instruments, one called a disjuncter, the other the chronograph. Although both circuits pass through from these instruments, yet they are kept distinct and separate.

The chronograph answers the purpose of a stop watch of greatest accuracy. Two bars are held up by electric magnets; the currents flowing in one magnet also flow through its respective screen, while the current of the other passes through the second screen. The disjuncter is an instrument which is used to break both circuits at the same instant. As soon as this is done the bars fall since

the electro-magnet cease to act when there is no current flowing through them. The bar connected with the first screen falls upon a small platform, which releases a wedge-shaped piece of metal. This strikes the bar connected with the second screen, leaving a wedge-shaped slit in it as a line of reference during the experiments.

#### DETERMINING THE VELOCITY.

This being done, the currents are established again and the rods placed once more under the influence of the electro-magnets. Let a 3.2 inch rifle whose muzzle velocity is to be found be placed in front of the first screen. The gun is aimed, fired, and its projectile passes quicker than the roar of the discharge through the first screen, breaking some of its wires; in another instant it is through the second screen, destroying its electric current, and at last finds a resting place in some distant sand pile.

The break in each circuit is communicated to all parts of the line instantly. If the times at which both occur can be determined the problem is solved. For instance, let the time it took to pass over the fifty yards be 0.75 of a second. Then dividing one by the other gives 2,000 feet per second as the velocity of the projectile.

The time is found by accurately measuring the distance between the first dent, the origin and the second dent, caused by the projectile breaking the circuits at different times. To illustrate the principle involved:—If the projectile be of low velocity the distance will be greater than if it travelled at a high rate of speed, since the first rod would have a longer time to fall before the second starts. If the distance be, say, one inch, then from the law of falling bodies the time for that fall can readily be found, and this will be the time it took the projectile to travel over the fifty yards between the screens. Expressed mathematically, this law is that the time of fall is equal to twice the distance of fall divided by gravity. Every thing in this equation is known after the experiment, excepting the time, which is readily figured out.

So accurate is this determination that the velocity of the swiftest projectile can be found to the fraction of a foot. This means the measurement of time to the thousandth part of a second—a fraction too small to comprehend.

#### HOW THE TRAJECTORY IS DETERMINED.

The trajectory of a projectile is the path it travels, and the way of discovering it is simple. Screens are put up in line at intervals of 100 yards. These are covered with target cloth and are so built that they can be raised or lowered by ropes running over pulleys, which are in the framework that supports the screens. The rifle is put in a vise, the muzzle being at the same height as the distant bull's eye. Upon the discharge of the gun the bullet will leave a hole in each screen, and from these its trajectory is easily deduced and transferred to paper.

This work is very important, since a bullet that rises over a man's head in passing a distance of 500 yards is much less effective than one which skims along the ground for the same distance. For instance, in the illustration we have the trajectories of a modern small bore and the old Springfield compared. In going 500 yards the latter travels up 8.16 feet, while the former only rises 3.85. By examination of the chart it will also be seen that between 400 and 1,200 feet, or more than half the total distance, the bullet of the Springfield passes above all ordinary sized men, while that of the modern rifle would hit any man standing between the muzzle and the bull's-eye 500 yards away. It is partly on account of these flat trajectories that such terrible loss of life is expected in the great war. One of these bullets will kill eight men and still have some energy to spare.

Guns of all sizes shoot much more rapidly than they did a few years ago. This, combined with flat trajectories, great velocity and carrying power, will materially change many of the conditions of war, the successful general will be he who comprehends and makes efficient use of the fire of modern fire-arms.

### A New Process of Coloring Leather.

A modification of the ordinary brushing process has recently been introduced in Germany, quotes the Textile Journal of Bombay, and in this method of dyeing the zinc-covered table upon which the hide or skin is placed forms the positive pole for the generation of an electrical current for inducing a certain reaction. The fluid dyeing material is poured upon this table, and the negative pole is then connected to the leather. Under the action of the current, the coloring matter penetrates the immediate surface of the leather, and the intercellular fixation and distinction is said to leave nothing to be desired. Patterns may be made upon the leather by covering it with an ordinary stencil system, and on connecting these plates to the negative pole, the desired representations are formed.

### The Floating Machine Shop "Vulcan."

The floating machine shop of the United States navy has been named the "Vulcan," and this vessel is now with Admiral Sampson's fleet and was ready to repair any damage which might have been sustained at the hands of Admiral Cervera; but it is likely that now she will devote her attention to saving some of the wrecked vessels in conjunction with the wrecking companies. It is said that \$300,000 were spent in altering and equipping this vessel. Officially the "Vulcan" is an engineer's repair ship, and formally she was the steamer "Chatham." Shortly before the war Engineer-in-Chief Melville recommended that two vessels be purchased which could be transformed into engineers' repair ship and attached to the Atlantic and Flying squadrons. Only one steamer was purchased by the Auxiliary Board, and she was transformed at the Boston navy yard. While the ship is not intended for fighting purposes, she carries two rapid fire 6-pounder guns. The "Vulcan" is to follow in the wake of the fleet, and she has a large coal capacity which will give a wide radius of action. She will also supply fresh water to other vessels and make such repairs as may become necessary. The bow of the boat is devoted to a stock room; back of this is the blacksmith shop, foundry, and machine shop. There are also evaporators and distillers of a capacity equal to a daily output of 10,000 gallons of water. There is a complete foundry with a cupola, which will enable castings to be made on the boat. She has two steam cranes with 10-foot arms, which are specially designed for moving weights from a man-of-war and for transferring machinery to a disabled ship. There are also plate-bending rolls, punches, shears, lathes, planers, drills, milling machines, and other machine tools, which will enable them to repair the hulls, engines, and boilers or guns. The "Vulcan" carries a large complement of first-class mechanics, and the repair shop has some of the finest engineers in the country. It is doubtful if any vessel has yet started out to war which has carried such a large complement of well trained and well-educated men. The "Vulcan's" captain is Lieut.-Commander Ira Harris, who has been general manager of the Chicago Drop Forge and Foundry Company. The chief engineers are Gardiner Sims, the head of the Armington-Sims Engine Works, of Providence, R. I., who has thirty of his best mechanics aboard, and Prof. Aldrich, of the University of Virginia, one of the best electrical experts in the country. Out of her entire crew of 200 men, ninety-two have the right to wear the officer's cap.—*Scientific American*.

### Colt's Machine Guns.

The principle of the Colt guns, the very latest weapons of modern warfare, gives no hint of their murderousness. A three-foot blued heavy barre with a pistol butt and trigger and a calibre, the size of a pea, this barrel fitted into brass pivots that permit a sweeping aim, up, down or around—that's all. Yet through that little aperture, smaller than a baby's finger, are projected invisible death engines that would cut platoons of men in pieces. The gun is literally a death buzz saw when swept slowly from right to left and left to right. If held stationary for a moment the discharge assumes the force of a shrapnell shell that never stops, and ordinary torpedo boats may be sunk by its force. By the side of the barrel is a wooden box. In this 1,000 Lee rifle cartridges, with the small calibre steel bullets, charged with smokeless powder, are coiled on a tube, like an endless cartridge belt. The end of the tape is pulled sidewise through the gun, the trigger is pulled, and then the gun shoots, ejects the loads without further human agency. After that the gunner simply directs the sweep of fire. A few inches from the muzzle is a vent down into a chamber underneath in the barrel. At the first discharge a small percentage of the gas proceeds through this vent, forces out a lever as the marksman's hand forces down the lever of a Winchester rifle, and this flying lever in turn propels the mechanism, and as the spent cartridge is ejected, another is drawn in and struck by the hammer. In an instant the gun pours bullets like a stream from a hose, each cartridge exploding the next, at the speed of 200 a minute. Directed at a file of men up to 700 yards the effect is terrific, for the bullets of steel, that looks like tiny pencils, will go through six men. Some time ago Lieutenant Pond tried the gun at the New York navy yard. He had twenty inches of oak and a three-eighths inch steel plate. To make sure, he added another one-eighth inch plate. Then he couldn't find the bullets. Upon search he found that they had gone through the twenty inches of oak, the three-eighths-inch steel plate, the one-eighth inch steel plate, two sides of an old iron boiler and the brick walls of the building.—*Boston Journal of Commerce*.



### The Gibraltar of the Pacific.

(Continued from page 93.)

churches, public hospitals and many other evidences of up-to-date progress.

The Hawaiian group contains eight inhabited islands and a large number of smaller ones, comprising a total area of 7,000 square miles, making an area about the size of Massachusetts. The islands extend east and west a distance of 1,200 miles, and the eight principal ones cover 300 miles at the end of the group.

From a strategical standpoint the Hawaiian Islands are of vast importance to the United States. They are near to the middle of the North Pacific Ocean between 18 deg. and 22 deg. north latitude, and 154 deg. and 160 deg. west longitude, and are the hub of the Western Hemisphere.

Hawaii is in almost a direct line from San Francisco to Hongkong,—a distance of 6,997 miles—is near the principal trade routes across the Pacific, and is the only spot in this ocean, between America and the east and Asia on the West, where water, food or coal can be obtained.

We are indebted to the kindness of the Evening Star for the cuts accompanying this article.

### The Bicycle in the United States.

As in most other articles of manufacture the United States takes the lead in making bicycles—in the excellence of workmanship, lightness, speed, and in the number of the output.

It has been estimated that the number of wheels owned by individuals in this country is about 4,000,000, but a more conservative estimate places the aggregate at 3,000,000. This, of course, does not represent the total output of the American manufacturers, for there are always in stock at various supply places and at the factories many thousands of the silent and valuable steeds.

The value of the bicycles in use, if estimated on a basis of \$100 for each wheel, can be put at between \$300,000,000 and \$400,000,000. And if estimated on a basis of \$70 per wheel—perhaps a more accurate figure—this for 3,000,000 wheels would amount to \$210,000,000, an enormous sum of money.

In connection with this important wheel of industry and mechanical progress, we quote at length the following:

In Washington, the capitol of the nation, a city recognized as a wheelman's paradise on account of its miles of good smooth streets, there are estimated to be 40,000 wheelmen out of a population of 250,000. This represents an outlay of \$400,000 in this one city alone for bicycles. This is perhaps the best showing of any single city in the country, but there are cities which will come close behind it. With its present population the ratio is now one wheelman to every seven of the inhabitants, and this is about true. Everybody appears to ride in the capitol city, the young as well as the old, the men as well as the women. Judging by the number of girls and old ladies on the streets at all hours during the day a visitor would think that the bicycle population was made entirely of females.

According to the estimates first given the ratio of the bicycle population to the total population of the country is less than one to twenty-four, a number that is not equaled by any country on the face of the earth. This only shows the progressiveness of the American public and the adaptability to circumstances. Less than six years ago the safety bicycle was an almost unknown thing to a majority of the residents, but during that brief time the people have become use to the silent steed, recognized its usefulness and set the seal of approval on it. From a luxury it has grown to a necessity, and is now used in almost all branches of trade. If the feeble, the aged, the young children, and many of the female population of the country be excluded from the calculation the ration of the bicycling population the population suitable for riding bicycles in this country would probably be one to ten or perhaps less.

Continuing the calculations still farther, if the tubing used in all of the bicycles in use in this country were stretched out as to make one continuous piece it would encircle half way around the earth, at the equator, or would reach across the Atlantic Ocean, from Liverpool to New York nearly four times. This is on a basis of twenty feet of tubing to a machine. If the wheels were placed one in front of each other, the rims touching, there would be more than enough to span this country from New York to San Francisco, forming one continuous line. Allowing 200 wheels for each car it would take 1,500 cars to hold the lot, which, if coupled together, would make the longest train ever known. If the handlebars were taken off and placed side by side,

giving an average width of eighteen inches, the line would extend for nearly 862 miles. If one man had the job of pumping up the tires and allowing him one minute for each tire it would take nearly seventy years to perform the job, working continuously, or the lifetime of two men practically.

It has only taken ten years to accomplish this result. In fact it has only taken six or seven years. Prior to that time most of the wheels used in this country, especially the old ordinary, were made in England, the country that was regarded as the home of the wheel. It now bears that title no longer. It lost more than this. There was a long time when the English riders held almost all the world's records in bicycling for long and short distances, and now this glory is a thing of the past. The American riders have lowered all of the small distance records, while the French riders and cyclists of other parts of the world have taken away the long-distance records, leaving England with only a small part of prestige.

Up to a little over a decade ago there were only six bicycle manufacturers in this country, with a total yearly output of a little over 10,000 wheels, less then the number which was imported annually at that time from England. In the space of eleven years the number of factories in this country had grown from six to over 500, and in this last-named figure is not included the small shops. From an output of 11,000 bicycles annually in 1885, the number increased close to a million wheels. The several hundred factories having a capacity of 1,000 wheels or less a year, not included in the above number, will swell the total output to a full million bicycles that were made in this country last year. Last season was undoubtedly the banner year for the manufacturers. The decrease in the price of wheels made it necessary to turn out a larger number of machines in order to make the profits equal to those of the previous year. Though there was considerable talk the season before last of the manufacture of 1,000,000, the total number fell far short of this figure, but last season, despite the depression in financial circles, and the failure of more than one concern, the total output for the year amounted to fully a million bicycles.

It was only about six years ago that the American capitalists recognized the money in bicycles, and then there was a stir to compete with the imported wheels. Seventeen factories were started, manufacturing 40,000 wheels, and the sale of these had an effect upon the imported goods from England. The success of these pioneer factories encouraged others to embark in the field, and the old ones to enlarge their plants, so that four years later the output for the country amounted to over 100,000 cycles for that year. In 1895 factories were built in all sections of the country, and the total output for that year was placed at 600,000, a big jump from a year before. And in the face of all this, it is predicted that the total output this coming season will far exceed that of any previous year. Truly, it seems as though every able-bodied American will be riding the bicycle within the next few years and not content with this the riding will be general all over the world.

If all the wheels that were manufactured in this country were sold within its borders the percentage of the bicycle riding population would be much larger. As has been stated, a large proportion are shipped to countries in all sections of the earth. The Treasury Department keeps on record every bicycle that is exported from this country, the though the results for the past year have not been tabulated as yet, an approximation is given of the value of the machines shipped abroad. The tables are reversed, and the lion has been bearded in his den. Instead of England supplying us with wheels we supply her, in spite of the fact that she claims her factories exceed ours in point of capacity and can supply the entire world with wheels if necessary.

The total valuation of the exported wheels from this country last year is slightly less than \$5,000,000 and as the valuation price is much less then the selling price the number of machines is much larger than would be calculated. England took the largest share of the exports, the balance showing sales amounting to \$1,500,000.

The difficulty which the government has recently experienced in securing merchant vessels suitable for transport ships for troops and supplies is likely to lead to a revival of ship-building. The decline in American ship-owning dates from the war of the rebellion, since which time vessels which have been sold from under the American flag or gone out of service have not been replaced by American owners. The present war has shown the supply of vessels in the American merchant fleet to be smaller than it might otherwise have appeared. According to the neutrality laws foreign vessels cannot be engaged for government service in time of war unless registration is made in foreign ports; and this requires a special act of Congress in the case of each vessel registered.

### Smokeless Powder.

Cordite has other advantages besides its smokelessness. Not only is it more powerful than ordinary brown powder, nearly three times as powerful in fact, but it is capable of giving, power for power, a higher muzzle velocity to the shot than powder can without exerting any more strain on the gun. What is wanted in a propulsive substance is one which will exert a very high pressure upon the projectile, and keep up that pressure until the projectile leaves the muzzle. To maintain the pressure, the evolution of gas caused by combustion must continue until the muzzle is reached by the shot, but it should then cease, or there is waste of energy. If the evolution of gas is too rapid, there is not only undue strain to the breech of the gun, but as the producing of gas ceases before the shot leaves the gun the force causing its motion and hence its velocity decrease in the barrel of the gun. The reason why dynamite cannot be used for artillery, in spite of the immense energy which it develops, is that this very circumstance is due to the rapidity with which it is converted into gas. Almost as soon as the projectile has begun to move, the pressure has risen to its maximum, and the greater part of the journey of the shot in the interior of the piece has to be carried out under diminishing pressure and against enormous friction. At the same time the breech of the gun experiences an expanding force of a magnitude in strict accordance with the suddenness with which it comes into existence. The same drawback, to a smaller extent, occurs with the use of ordinary gunpowder if it is finely divided, and it is almost universally known that for heavy ordnance the powder has to be moulded into solid masses of considerable size, such as pebble powder. It then burns less rapidly, and unnecessary stresses in the gun are avoided. It has been found by experiment in America that the 6-inch gun fired with cordite will give its projectile a muzzle velocity of 2,650 feet per second for the same breech pressure that is experienced when the usual powder charge is giving a muzzle velocity of 2,080 only, a cordite charge of less than half the weight which is required of gunpowder being employed.

### Telegraph and Telephone War Tax.

The war taxes are now being imposed and their collection appears to be going along very smoothly. No one likes to be taxed, and the readiness with which the new burdens are assumed must be taken as another proof of the strength of the national feeling that is behind the Government in the war with Spain. The special one-cent telegraph and telephone taxes have been arranged for without difficulty. The telegraph companies have left it to their customers to put on the penny stamp, and while one hears some sharp words about this action, generally it is quietly acquiesced in. In New York City the local telephone company has wisely made its long proposed reduction of tolls coincide with the imposition of the tax, so that the 15-cent message is now 10 cents, and no one is a bit the worse off except the Government, and the amount that the Government loses is too small to worry about. In other parts of the country the telephone exchanges are for the present apparently leaving their rates unchanged and paying the one cent themselves.—*Electrical Engineer*.

### Wheat Production.

The statistician of the Department of Agriculture has issued a detailed statement of the world's wheat production in 1897. The United States heads the list with 530,149,000 bushels, followed by France with 251,298,000, Austria-Hungary with 133,370,000, and Germany with 107,000,000 bushels. All other continental European countries with their enormous population to support, produce 600,000,000, and the United Kingdom only 54,527,000 bushels; Argentina, which is so often quoted as being such a great wheat-producing country, could furnish only 32,000,000 bushels. The totals for the world in the last seven years are as follows:

1897 .....	2,214,300,000
1896 .....	2,428,000,000
1895 .....	2,546,000,000
1894 .....	3,676,003,000
1893 .....	2,563,000,000
1892 .....	2,482,000,000
1891 .....	2,432,000,000

From the totals it will be seen that the United States furnishes nearly one-quarter of the total wheat produced in the entire world, so that it is little wonder that other nations regard with anxiety the war or any thing else which tends to prevent the exportation of wheat and flour in accordance with the ordinary laws of supply and demand, and any raising of the price of the breadstuffs of America is sure to be a calamity to some countries where economic laws are quick to respond to any fluctuation in the price of this most important commodity.



## A WONDERFUL FACTORY.

At the base of a gradually sloping hill, which overlooks the beautiful city of Dayton, Ohio, stands one of the most wonderful factories in the world. Not wonderful only in that which it produces, but in its system of management, which, in the opinion of the writer, is pre-eminently ahead of all other systems used in the factories of this or any other country, and which has proved to be for the best good of both employer and employee. This system is known as the "Dayton Plan," and was originated by John H. Patterson, President of the National Cash Register Company, of which factory I am writing.

At the head of this organization are the president and vice-president, who occupy the position of a court of "Final Resort." Next to these gentlemen, and controlling the general business, is the Executive Committee, composed of twelve officers of the company. This organization is divided into three great divisions, viz.: The Selling Office and Making Divisions, and these have under their control committees, such as Advertising System's Agents', Office, and Factory Committees. Under the last-named committee are committees for each different principle of machine manufactured, and all differ-

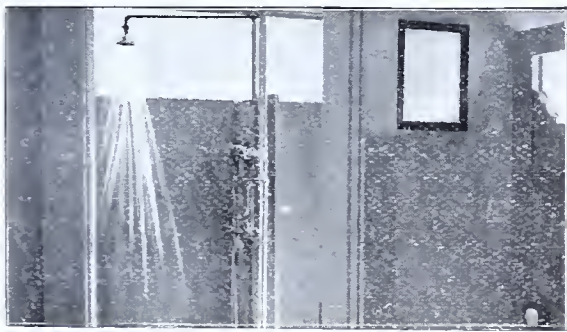


MAKING A SUGGESTION

ences and questions arising in the factory are referred to them, and should they not be able to satisfactorily decide the question or difficulty it is referred to the next higher committee, and so on until it reaches the supreme court or "Court of Final Resort," and is there impartially decided.

All through the factory placards, reading, "Prizes given for complaints or suggestions for any improvement in the manufacture of Registers or in conduct of the business," are conspicuously displayed. Every six months \$500 in gold is awarded as prizes to the employees for the best complaints and suggestions.

It is needless for the writer to ever suggest what a stimulus this part of the system gives to the employee, and the great benefit derived therefrom; for every one is made to feel that he or she has a personal interest in the work being done.



MEN'S BATH ROOM.

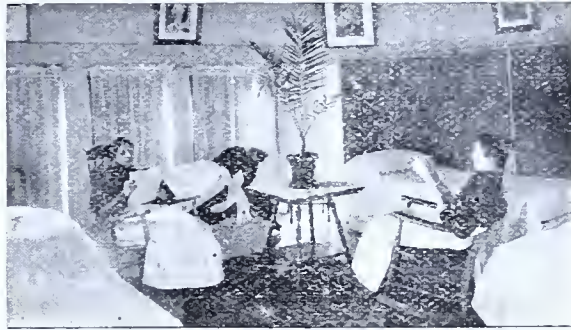
There are over 300 young ladies employed in the various departments, and no where will you find another factory in which so many advantages for improvement are offered to women. They come to work at 8 o'clock in the morning—one hour later than the men. After working for two hours they are given a recess of fifteen minutes, during a portion of which time calisthenic exercises are indulged in. By this exercise they are relieved of fatigue. Their noon meal, very tastefully prepared and cooked by experienced hands, is provided at the expense of the company.

In the afternoon another recess of fifteen minutes is allowed, and when the time for quitting comes they are permitted to leave fifteen minutes before the men, thus avoiding the inconvenience of crowded cars.

They are given a half-day holiday each week at the company's expense, also a whole day once a month at the company's expense in which to do

their shopping or rest as they may desire. In convenient parts of the factory are small rooms furnished with snowy white cots, to which young women may go in case of fatigue or sudden illness.

My readers unfamiliar with this system of factory work might be inclined to think it a detriment from a business standpoint, and right here allow me to quote Mr. Patterson's own words on this subject. He says: "Although we have reduced the young women's time considerably they do the same amount of work they did when working the full ten hours. They give us better and quicker work, and it has



WOMEN'S REST ROOM.

been a source of great profit to us."

From the writer's own experience during the past five or six years in factory work, though never in the employ of this company, he can truly say that the words of Mr. Patterson, quoted above, echo the feelings of everyone of the 1,400 employees of this company, and, in fact, wherever men and women are employed in factories, because a man who works for his living is possessed with those same higher qualities of being as those for whom he works, and very often possesses latent power and ability, which can only be brought out through kindness and appreciation shown in one way or another by his employer.

The factory of this Company is one which any city should be proud of. The buildings, from the exterior remind one of some of the larger Exhibition stalls at the World's Fair. The main building has three stories and a basement and the total floor space of the plant is 8½ acres. The factory is situated in the beautiful suburb, South Park, one of the most picturesque sections of our city. Not many years ago this portion of the city was nothing more than a "commons," but today through the untiring efforts and the offering and distribution of cash prizes in gold by the N. C. R. Co., for the best kept lawns and yards, and the most artistically arranged flower beds and shrubbery, the eye is delighted, and Dayton is proud to be the possessor of a spot changed as if by magic from a scene of wilderness to one of pleasing beauty. I might here mention briefly, that this company, originated and has under its supervision, a kindergarten where forty or more little ones of South Park are taught their first lessons, also a Sunday School, Mother's Guild, Dramatic Society, Choral Society, Autoharp Club, Industrial, Cooking and Sewing Schools, for girls and young women, a Bicycle Club, and a full Brass Band.

Is the writer in error when he calls this a Wonderful Factory?

Now let us step inside for a few moments and visit a few of the more important departments. A guide is furnished you on entering, and after registering your name and address you are taken through the Administration Building, then the Machinery Hall, which latter building is 350 feet long, fifty feet wide and four stories high. In this building over five hundred men are daily employed in nearly every branch of mechanical art, and a happier and more contented body of workers you



N. C. R. KINDERGARTEN.

could not find the world over. The men throughout the entire factory are each allowed twenty minutes during the week in which to take a refreshing bath; shower-baths of hot and cold water with the most modern appliances being provided for this

purpose. These baths are in convenient places throughout the factory and are kept clean and in proper order by men employed solely for this purpose. In passing rapidly along let us peep into the Final Inspection and Testing Department where thirty-one men are busily engaged in the final steps in the construction of the Registers. Here the Registers are very carefully inspected and every portion and working part thoroughly examined and tested before being sent out.

We now bend our way to the Indicator Department, where a hundred or more young ladies with snowy white aprons and sleeves, (kept white at the Company's expense,) are engaged in placing the figures and letters on the indicators of the machines. Very important work is expeditiously and perfectly performed in this department. We now ascend to the fourth floor, and are shown the ladies' dining room which is truly a marvel of beauty, the chairs, tables and wood-work are finished in white



WOMEN'S DINING ROOM.

enamel. Gracefully twining around the pillars and about the walls of this room are vines somewhat resembling the ivy which gives the room the appearance of a summer garden at all times. All along your way through the factory you notice large and small palms growing, which add greatly to the beauty and freshness of the various rooms and halls. On our way to the Advance Club or Lecture Room we caught a glimpse of the Mailing, Photographing, experimental and Telephone Departments which are located on either side of the hallway.

In the lecture hall or advance club room Mr. J. H. Patterson addresses the employees at stated times on matters of interest and importance. Here also the advance club, composed of the heads of departments and their assistants, and several of the employees of the different departments, meet once in two



A CORNER OF THE LAWN

weeks to discuss matters of importance relating to the improvement of the business and the cash register.

Should you, Mr. Editor, and any of your intelligent readers ever have occasion to visit our city you would be royally welcomed at this wonderful factory, where are produced every day eighty or more of the most trustworthy assistant book-keepers, lightening calculators, and safe depositories in the most convenient and compact machines this country has ever seen, and which are known the world over as National Cash Registers.

RORT. L. FENWICK, Dayton, O.

During the first half of 1898 nearly 1,100 miles of railroad were built in the United States.

In some parts of South America it has long been the custom to employ women as conductors on the street cars. The practice has now been taken up in this country by the Chillicothe, O., Electric Railroad, Light and Power Company.



## THE HUSSEY MILKING MACHINE.

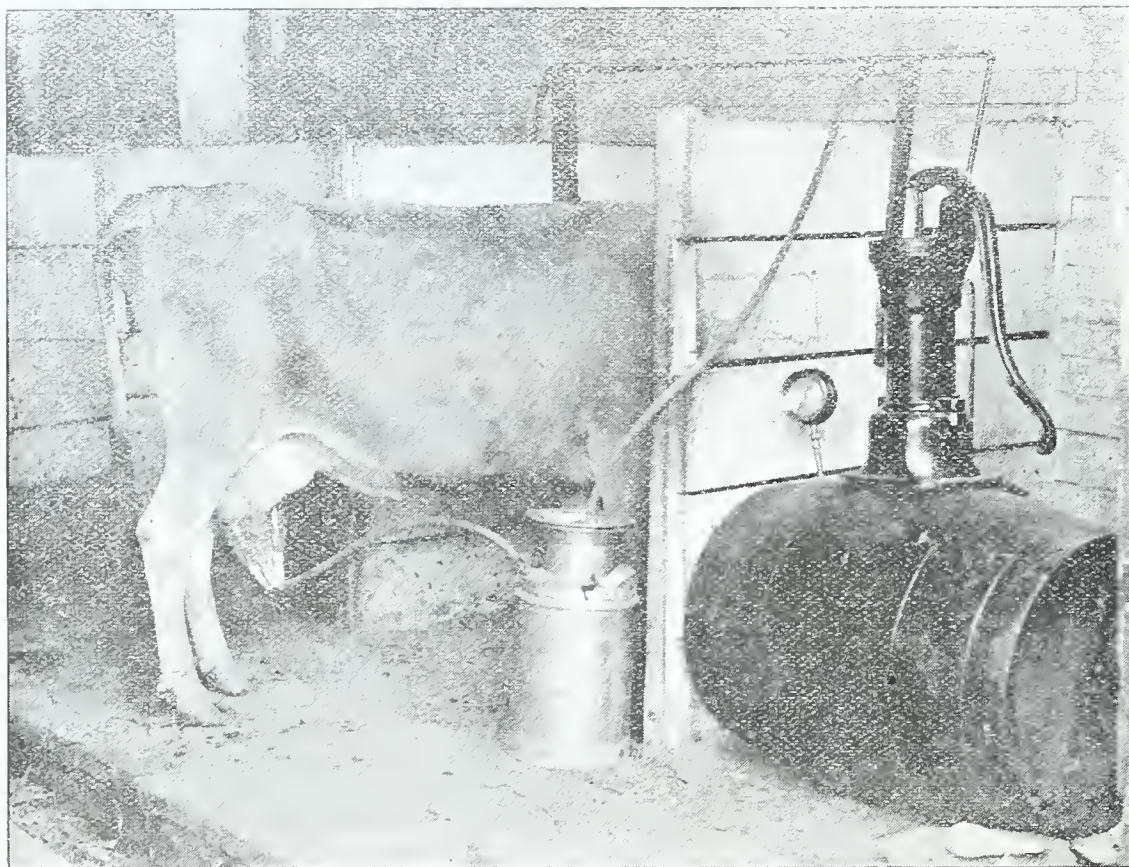
NEW ORLEANS AND CUBA.

A machine that will milk twenty cows at one operation, and do this speedily and without injury to the animals is worthy the consideration of dairy men. This is part of the good qualities claimed for the machine of this kind, which is made at Mt. Pleasant, Ohio.

In describing the machine the inventors, A. H. Hussey & Bros., give the following information:

"This machine consists of an air pump set upon or near an iron or wood vacuum tank, and connected with it by a pipe. On the tank is a vacuum gauge to register pressure or suction.

From this vacuum tank a small gas pipe extends along and above all the cows to be milked, with cut-offs made by a stop-cock to each cow, or one between two cows, when two are to be milked into the same can at once. Milk cans are set near the front feet of the cow and made air-tight by a rubber band around the neck of the lid and held tight by a clamp



on top of the lid. The stop-cocks on the pipe are so made as to slip a rubber hose on them, which hose reaches to a stop-cock in the lid of the can, through which the air is exhausted from the can. On the side of the milk can near the top is another stop-cock from which a rubber hose is placed, air tight, and extends back to the cow's teats. On the end of this hose is a union which connects the teat cups together by a short rubber tube. The teat cups are made of glass, so the milk can be seen as it flows from the cow. They are large enough to receive the entire teat, and have grooves near the top to hold a soft rubber gasket, in which a hole is cut to suit the size of the teats. When all is ready, and every joint and connection is air tight, the stop-cocks are opened between the can and the pump but closed on side of can through which the milk passes. Then start the pump, which by a rapid stroke of the handle for about thirty seconds will raise the gauge to about twelve, which is as high as it ought to go. When this is done then insert the hose on which the teat cups are placed on the stop-cock on side of can, and place the teat cups up close to the end of all the teats. Then open stop-cock at milk can, and the teats will be drawn down into cups by the suction from can. If it is difficult to get all teats in cups at one time, turn cups down and hold them there, except one to put on the teat and when it is drawn into cup, then shut off the suction by stop-cock and put in another teat the same way until all are in and the milk will flow as suction is turned on. By skill and practice, which sometimes takes several days, milking is done rapidly and easily. The gauge must be watched, and kept up sufficiently by pumping to keep the milk flowing.

The parts through which the milk passes should be rinsed in clear water before milking begins, and as soon as done, then run clean water several times through them, and hang them up to dry. The cleansing takes but little time. As often as needed these parts should be washed in strong sal. soda water as cleaning other milk vessels."

The price of these machines—\$100 for milkers for from ten to twenty cows—should bring it within the means of all prosperous dairymen.

### The Commercial Relations of City and Island.

Mr. F. T. Roth, a visitor in New Orleans, is inclined to the belief that that city is to be the half-way house between the richest islands in the world and the richest islands in the world and the richest country in the world. In an interview with the *Picayune* he said:

"The future for New Orleans, apropos of the war, is one so bright that your people here should take courage and go forward. It is a moral certainty that Spain will be driven from the islands. It is just as certain that the United States, even if we do not occupy the islands with part of our standing army, will have something to say in the ruling of them. This will mean that this country and Cuba must come closer together commercially. That, in turn, will mean the establishment of closer communication with Havana, and the building up of friendlier relations. Coming along with these

things there must of necessity be a base of operations somewhere—a point where the interchange and exchange of business will be located. New Orleans will be that place. Why, I expect to see the day, and not far in the future, either, when there will be a first-class line of steamers from this city to Cuba, making the run every other day, or possibly daily, when there will be branch houses of all the leading branches of business in New Orleans established in Cuba, and when this country and that will be almost inseparably bound together by commercial and other ties. That is the only hope for Cuba. The there will never govern themselves—never grow, at least, into the full stature of nationality. There will be started, as soon as this war is over, a great amalgamation of the races. Cubans will be swallowed up in Americanism, and in the end Cuba will become one of the United States. But all this will take time. The immediate effects felt in New Orleans will be the development of this city as the point of inlet. You see it is only 600 miles to Havana—a matter of seventy-two hours' run from this city. Well, there will be a shortening of this time, and fine ships put on. Then there are other results which will be far more beneficial to New Orleans. When all that country has once been placed in the hands of the right rulers, the dreaded fever, which for generations has been a constant menace, largely an imaginary one, however, to this city, will be removed. The islands will be cleared of all such dangers, proper precautions will be taken, and there will never be another case of the fever in the South, for the reason that the breeding beds will be removed. This will mean the flocking to this State of capital from all over the East. The dread of fever here has ever been a source of depression to the development of the South, such development as you are entitled to."—*Manufacturers' Record*.

The 34 transports which carried the invading army to Santiago cost the government about \$15,000 per day, exclusive of coal. The tonnage of these vessels approximated 75,000 tons,

### Hanna's Bill Unconstitutional.

Editor *Inventive Age*:

SIR: In your May number, page 69, I find the text of a bill introduced by Senator Hanna for the relief of infringers of patents. I presume so long as we have a patent law, tinkering with it, or attempts to tinker, will still go on. One would suppose that learned senators would be acquainted with the constitution and know its bearing upon legislation which they propose.

The constitution, section 8, clause 8, confers upon congress power to make a patent law, to fix the term during which patents may endure and the fees; but Congress has no power to attach conditions or otherwise abridge the franchise. The rights conveyed must be exclusive or nothing. Hence the statute provides that maker, seller and user are all equally infringers of a patent used without the owner's consent.

Mr. Hanna's bill provides that the patentees must establish their claim. With all due respect to the senators, a patentee does not have to establish his claim. His patent is *prima facie* proof of his claim, and it will be sufficient unless successfully rebutted. The rights referred to in the patent were not created by the government, and the inventor who did create them is not under any obligations to make any contract with the government. The government guarantees to the inventor seventeen years exclusive use if he will take a patent and thereby dedicate the invention to the public, and under the constitution it can not give him any use less than exclusive. It is therefore submitted that congress has no power to confiscate an inventor's property in his invention in the way suggested, nor in any way dictate to him what he shall do with it during the term of his patent.

R. D. O. SMITH.

### Genius of Invention.

A very interesting question relative to the nature of invention has recently been under discussion in the columns of the technical press. It is an idea firmly fixed in the popular mind that inventions are produced only by person peculiarly endowed by nature with what is called "the inventive faculty," a sort of inspiration of genius. This is, in fact, the basis upon which rests the whole system of our patent laws, which are framed for the encouragement of persons so endowed to use their peculiar faculty for the public benefit. It is remarkable that this idea is generally negated by the very persons who might reasonably be expected to favor it—the inventors themselves. An eminent man of science has defined genius as "capacity for endless hard work." Edson, when applied to for an opinion as to the inspiration of inventive genius, is said to have exclaimed: "Inspiration! Bah, it is perspiration." When the mists of prejudice have cleared away, it will doubtless be acknowledged that invention, like every agency in nature, is a process of evolution. Even in the case of such astounding achievements as the telephone and phonograph, which have startled the public with their apparent originality, the germ will be found by investigation in some long abandoned attempt which has failed because the times and means were not opportune. Lying dormant or struggling up through difficulty and failure until favoring conditions supervened, it burst upon the public view like a new creation, but to be followed by a long course of growth and improvement, with ideal perfection forever in the future.—*Electrical Review*.

### Invention is Labor's Friend.

Strange as it may seem, the belief that invention tends to displace labor and lessen the field of employment is still very common. Probably this is because most people see only the immediate effect of a given innovation, and do not take time or trouble to trace out the larger results. They reason chiefly from local and individual experience, and ignore or overlook the general social facts. Nobody denies the fact of temporary displacement of labor by improved machinery, and the hardship, often severe and prolonged, that attends the process. This is a problem by itself, requiring special study and attention in order that in the constant transition from poorer to better industrial methods labor may be reabsorbed without a long interval of enforced idleness, or adequate insurance provision made for displaced laborers during such periods. But the remedy for this evil certainly is not to arrest the progress of invention and new methods of production. That would indeed limit the future opportunity of labor, because increase of employment depends primarily upon creation of new industries and such improved efficiency of old industries as will make possible cheaper production, and hence larger sales.—*Gulton's Magazine*.



## HOW TO INVENT.

BY THOMAS A. EDISON.

If you want a receipt to succeed as an inventor, I can give it to you in a very few words, and it will do for any other business in which you might wish to engage. First, find out if there is a real need for the thing which you want to invent. Then start in thinking about it. Get up at 6 o'clock the first morning and work until 2 o'clock the next morning. Keep on doing that until something in your line develops itself. If it don't do so pretty soon you had better shorten your sleeping hours and work a little harder while you are awake. If you follow that rule you can succeed as an inventor, or as anything else for that matter. It was the following of just such a rule that led to the invention of the electric light, the phonograph, and the kinetoscope.

I believe that any person, even of the most limited capacity, could become an inventor by sheer hard work. You can do almost anything if you keep at it long enough. Of course, the man with a natural aptitude would get there first, but the other plodder would eventually gain his point. The constant brooding on the one thing is sure to develop new ideas concerning it, and these in turn, suggest others, and soon the complete idea stands out before you. Above all things a man must not give up, once he has outlined his plan of action. A ball rolling down hill is sure to reach the bottom ultimately, no matter how many obstacles stand in the way. It is this principle which finally levels mountains. So, once fairly on your way, don't stop because of some seemingly impassable object in front of you. What you want may be just beyond your nose, though you do not see it.

I once had that fact forcibly presented to me. I was working on an invention and finally reached that point where I could go no further. The thing lacked something, but, try as I might I could not tell what it was. Finally I got angry at it and threw the whole thing out of the window. Afterward I thought how foolish the action was and went out and gathered up the wreck. In putting it together again I saw just what was needed. Repairing the broken portions suggested it, and it was so simple I wondered I had not seen it before. Now that little addition of the apparatus could have been ascertained by a little thoughtful experimentation. I suppose I found it out quicker because of the "accident," but that does not alter the moral of the accident.

How do I go about inventing a contrivance? Well, that is hard to say. Everything requires different treatment. First, as I said, I find out if there is a real need for the thing. Then I go at it and attack it in every way I can think out. This multiplied attack soon simmers down, until I get what might be called a composite idea, something which is a combination of all that I have thought of before, or else the one feasible idea which seems to discount all the rest. Having once got started on what I think is the right track I keep up the pace until the goal is reached. The only thing, therefore, I can say to the young inventor is to go and do likewise. There is one piece of advice I can give, however. When a man starts in to invent, let him do so with his mind free from all knowledge of what has been done already in the particular field he is investigating. For instance, if I am about to work out something, I never read up on it, nor do I enquire what has been done on it by other inventors. Knowledge of this kind is almost certain to prove a snag in the path of the inventor. He gets into the rut made by his predecessors and stops off where they have stopped. On the other hand, if he goes in a direction of his own, there are no ruts ahead of him; nothing, in fact, to obstruct his progress. I have several times made inventions in this manner; then when I have completed them I have read up on the subject. I found my ideas were entirely original, but at the same time the ideas of the other fellows were so good up to a certain point, that I should have been tempted to follow in their footsteps if I had done any previous reading up.

Of course the question of natural aptitude enters into the matter, and without it no man can become a star; nevertheless, it is an auxiliary attainment; dogged perseverance is really the quality most to be desired. Dogged perseverance is the keystone to success. In the arts, such as painting, music, poetry, and so forth, a very special temperament may be required, but in the workshop of science men of the sanguine, 'sandy' kind come out ahead. The man who keeps at one thing and never minds the clock is always sure to do something. He may miss many social engagements, of course, but his success is assured.

If an invention is of great public utility it is seldom personally profitable to the inventor. If, on the other hand, it is a money-maker for the inventor, then

the benefit to the general public is apt to be limited. This is the fault of our modern patent office practice. Inventors are afraid to engage in large operations, which would have to be protected by patents, because our laws, as they now stand, give every opportunity for sharks to go in and infringe the rights of the legitimate owners, employing eminent legal assistance meanwhile to cause a stay in any lawsuits instituted by the rightful inventor. I have inveighed against this condition before now. It is a serious discouragement to all great public inventions, and it is a point which should be headed by all who intend bringing out an invention.

So, then, as things stand, if a man wishes to make money from his inventions he had better devise some little thing that costs but a trifle to manufacture. He will be sure to get fleeced if he does not. Then, when he brings his contrivance before the public let him manipulate the sale of his article so that no one can compete with him. His 'trade secret,' as it is called, will be more valuable to him than any patent office papers and it will cost him nothing to produce it. After all, however, I suppose the real simon-pure inventor is not apt to be a shrewd business man, and therefore the thing he wants to know principally is how to produce or invent. It is impossible to lay down any absolute rule. The history of great inventors shows that accident has been responsible for many initial ideas. This, however, is not always the case, nor should it be. Given a small amount of aptitude and a large amount of application, any man can enter the business of inventing and make a living—scant at first but more lucrative as he goes along. There are not many who realize what this "large amount of application" really means; the getting up very early, the staying up very late, and the sticking at it, meanwhile, with a vim that can never recognize failure. Men of this kind are sure to succeed. Probably millions of people are dabbling today in mechanical inventions of some nature, but the most of it is too spasmodic to count for much in the long run. They do not keep at it enough. If a business man were to neglect the routine business of his daily work, if he were to go to his office one day or two days in the week and then put the rest off until next Monday, or until some other time when the spirit moved him he would soon have to assign.

It is just so with invention. You have to pursue it as a business, and even more steadily than the ordinary business. If the young man starts into it with the notion of sitting down and waiting for some grand, good idea to come along, he will get, as they say, very decidedly "left." Ideas grow upon one. They are a matter of habit just like anything else. If you get into the habit of conceiving good ideas they will grow upon you until you have more than you need. It is, of course, impossible to make "a silk purse out of a sow's ear," and yet I don't know. Perhaps if one of these aspiring young inventors sits up long enough and thinks hard enough he may find some way of beating that old proverb after all.—From Chicago Inter-Ocean.

An inventor in Italy has constructed an apparatus for cooking by the heat of the sun. It consists of a box made of wood and lined with reflecting mirrors, at the bottom of the box being a small copper boiler, covered with glass to retain the heat of the rays concentrated by mirrors upon the boiler. In this contrivance any sort of food may be quickly cooked, the result being a stew or boil if the steam is retained, or if allowed to escape it is a bake. The heat with this device may be augmented indefinitely by increasing the diameter of the box. If the inventor will send along the Italian sun we may find employment for his device here.

A new style of stylographic pen has a barrel with milled edges to bring the date in or out of use.

## A New Method of Making Hard-Faced Armor.

Taking advantage of the fact that by suitably controlling the process of cooling, it is possible to obtain some of the newer alloys of iron with nickel cobalt and manganese in either a hard or malleable condition, M. Jean Worth, manager of the Societe Anonyme des Hauts Fourneaux et Acieries de Denain et Anzin, has devised a new process of making armor plate. M. Werth's contention is that the plate should have the chemical composition throughout, and that the hard face should be obtained entirely by a process of tempering. Ordinary carbon steel in large masses cannot be tempered satisfactorily, but when alloyed with suitable proportions of nickel, cobalt, or manganese it is possible to obtain the metal in a hard state by heating it up to a bright red and allowing it to cool in the air; whereas, if heated only to a dull red and cooled, the metal will be malleable and comparatively soft. The steel used by M. Werth is open-hearth metal, free from sulphur and phosphorus. It contains from 5 per cent. to 15 per cent. of nickel or cobalt, and from 2 to 12 per cent. of manganese; whilst within certain limits silicon, chromium, or tungsten may be present without interfering with the process of tempering. In its soft state such a steel has a tensile strength of 110,000 pounds to 140,000 pounds per square inch, and a strip of 1½ inches thick can be bent without cracking round a radius equal to its thickness. After the plate is completed it is tempered by making it a part of the side or bottom of the furnace. The face next the fire thus becomes heated to a bright red, whilst by means of water or air the temperature of the back face is kept down to 800 degrees or 900 degrees Fahr. To insure good results the heating is effected very gradually, the plate being put into a cold furnace; and by preference gas fuel is employed in the latter. Another method of effecting the heating, which is, however, only applicable to flat plates, is to immerse their front faces in a bath of red hot lead, the temperature of which is maintained very uniform. When ready, the plate is removed from the furnace and cooled at the back, until the front face has sunk down to a temperature of 800 degrees to 900 degrees Fahr., when no further attention is required, though if warped it can now be straightened before the cooling is finished.

## Commerce With Cuba.

It is announced that a steamship line to Havana, to be controlled by an American company, is being considered in this country. Vessels will probably be placed in service between New York, and possibly Baltimore, and the Cuban city. The idea, it is understood, is to complete arrangements with the view of beginning operations as soon as Havana becomes an American possession.

It is also announced that arrangements looking to the resumption of the iron-ore shipments from Cuba are being made, and that in the near future vessels will again be placed in service between Baiquiri, near Santiago, and Baltimore. At Baiquiri are very extensive and valuable deposits of iron ore, which is extensively used by the Maryland Steel Company and other American corporations. These mines are practically in possession of Americans at present.

The plant of the National Electrolytic Company at Buffalo will begin making chlorate of potash. It is the only one of its kind in America, and will have a capacity of 1,500,000 pounds a year. Demand for the article in the manufacture of smokeless powder has raised the price from 6 to 21 cents a pound.

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### Business in the Patent Office.

All the members of the additional force given to the Patent Office by act of last session of Congress have been put to work and the office is in better condition now than it has been for years past. Already there has been considerable gain on the work in arrears, and, we are informed by Assistant Commissioner Greeley that the business of the office will possibly be brought up to date by the first of the coming year. With the help of the new force, it is thought that the business of the Patent Office can be finished within thirty days from time of its acceptance, which performance represents what is called "up to date." For sometime the office has been steadily improving in quantity of its output, and for the week ending July 12th, the gain on the work in arrears was 381 cases.

By the time the heavy work of the office (which is in March, April, and May) begins, the twenty-eight new examiners will be fully acquainted with their duties, and with their help the quality of the finished product should be improved.

### The Manufacture of Firecrackers.

During the year ending June 30, 1897, there were exported from China 26,705,733 pounds of firecrackers, valued by the Chinese imperial customs at \$1,584,151 gold. The entire export was from the province of Kwangtung, principally (over 24,000,000 pounds) from the port of Kowloon. Of the total shipment, by far the largest part was sent by sailing vessels to New York. A small quantity went to England. Other countries buy only infinitesimal amounts. The exports represent only a small fraction of the amount manufactured and used in China. There are no large manufactories; the crackers are made in small houses and in the shops where they are sold. Only the cheapest quality of straw paper, which can be produced in the immediate locality where the crackers are made, is used for the body of the cracker. The powder is also of the cheapest grade, and is made in the locality where used. It costs 6 to 7 cents, gold, per pound. At Canton the ordinary-size cracker (1½ inches long by one-fourth of an inch in diameter) costs 62 cents per 10,000 for export. At Chungking 15,000 of the ordinary crackers can be bought for the same amount. Four-fifths of the crackers consumed in China are made by the families of those who sell them. It is estimated that 30 women and 10 men can make 100,000 crackers per day; for which work the women receive 5 cents and the men about 7 cents each.

### New Method of Preserving Meat.

A new method of preserving freshly killed meat has been discovered by a Danish zoologist, August Fjelstrup, who is the discoverer of condensing milk without the use of sugar. The system has been used in a Danish slaughter house for three months. The animal is first shot or stunned by a shot from a revolver in such a way as not to injure the brain proper. When the animal drops down senseless, an assistant cuts down over the heart and opens a ventricle, which allows the blood to flow out, the theory of this being that the decomposition of the blood is almost entirely responsible for the quick putrefaction of fresh meats. Immediately after the blood is let out, a briny solution, which varies in strength according to the time the meat is to be kept, is injected by means a powerful syringe through the other ventricle in the veins of the body. The whole process takes only a few minutes and the beef is ready for use and can be cut up at once. —*Scientific American*.

Some novel and promising innovations in the shape of time and of time markers have been introduced into the cab service of Paris, so that a person can know exactly how long the cab has been engaged, and can travel a short distance for a comparatively small sum. At the present time any person hailing a cab knows that the fare will be at least 30 cents.

King Leopold of Belgium has commissioned Mr. R. D. Mohun, United States Consul at Zanzibar, to build a telegraph line from Lake Tanganyika to Wadelai, on the Upper Nile.

### A Decision on Armor Plate Manufacture.

On Monday last a decision was handed down in the United States Circuit Court at Pittsburg by Judge Acheson in the case of the United States Mitis Company, against the Carnegie Steel Company. The former company alleged infringement of the Wittenstrom patent process of manufacturing castings from wrought iron and steel by adding aluminum. The defendant company admitted that the process it used in the manufacture of armor plate and steel ingots was somewhat similar in material results, but that it was no infringement because the application of the process was entirely different from that of the Wittenstrom.

The decision was in favor of the plaintiff. In his decision, Judge Acheson said:

"From the contents of the specifications it is plain that the Wittenstrom patent is not for any metal making process of manufacturing castings from wrought iron and steel. The patent process begins after the metal to be operated upon has been produced and brought to a molten condition. The

evil in the prior art which the inventor sought to remedy was the difficulty of obtaining good castings from wrought iron or steel without deteriorating the intrinsic character of the metal itself. This was the desideratum to which Wittenstrom attained. His invention consisted in the process of making castings from wrought iron or steel by the addition of a minute quantity of aluminum to the molten metal at the time the casting is effected and as an incident to the operation, whereby and without changing the intrinsic quality of the metal, superior castings are obtained—castings which are sound inside and externally symmetrical.

"Such being the Wittenstrom invention I reach the conclusion that it was not anticipated or suggested by any of the prior patents in evidence. The evidence is quite convincing that his invention was of a primary character. I am of the opinion that each of the two practices which the defendant has pursued is an infringement of the patent in suit."

The decision will not in the least affect the armor plate contracts which the Carnegie Company now has on hand.—*American Manufacturer*.

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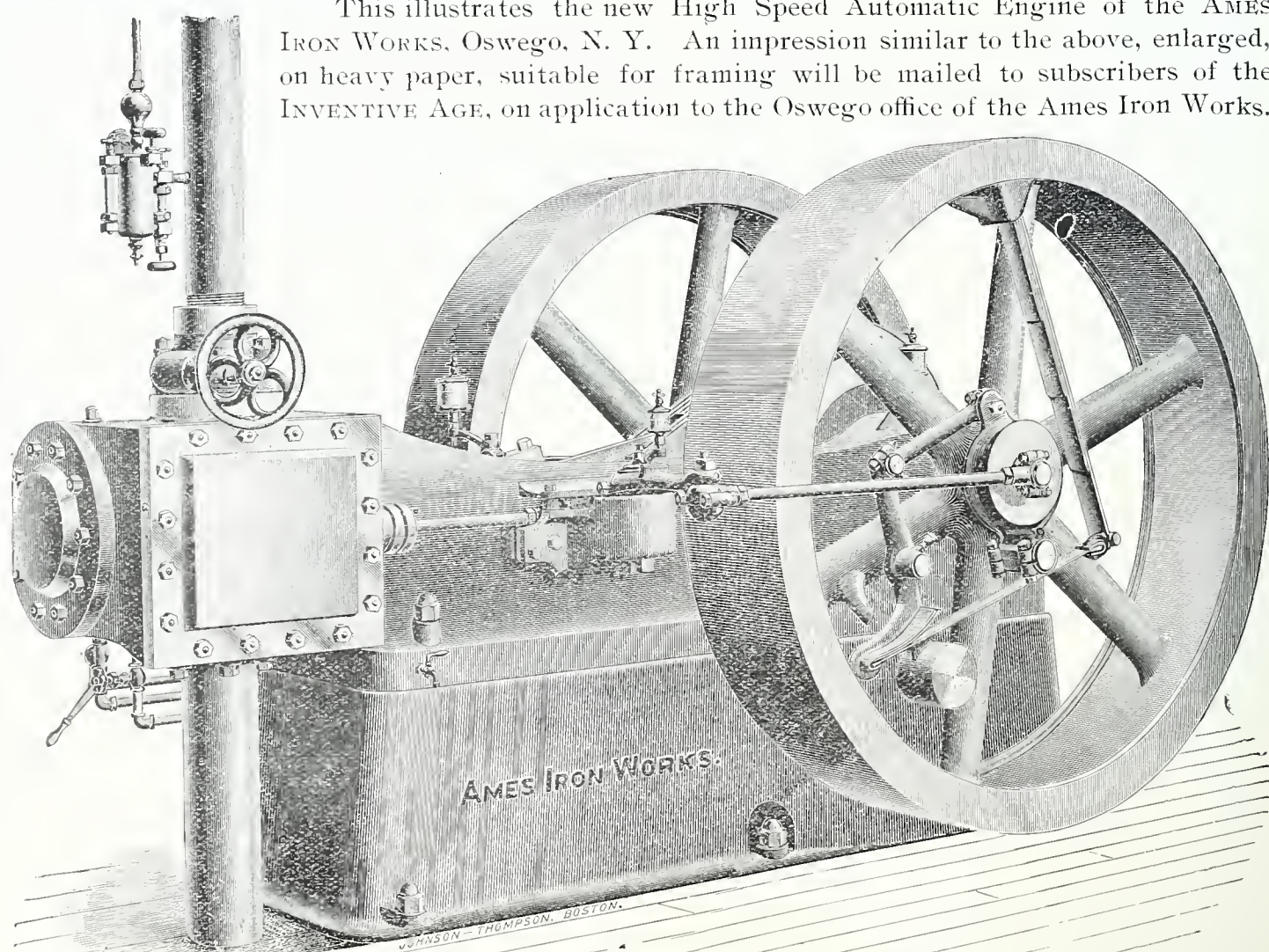
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### Disbarred from Practice.

Emma Jordan of Leavenworth, Kan., and C. Harding of the same place and John P. Hampton, Va., have been disbarred from practice before the Interior Department.

### Commissioner Duell's Vacation.

The Commissioner of Patents, Mr. T. L. Duell, accompanied by his family, has left California to be absent during August.

A contract was awarded for about 25,000 lbs. of steel plate a few days ago to the Carnegie Steel Company of Pittsburg, for four steel steamships now in course of construction by the Morgan Steamship Company. The vessels are to be run between the United States and South America. The Newport News, Va., Dry Dock and Ship-building Company let the contract. The contract involves in the neighborhood of \$750,000. — *Age of Steel.*

A giant raft 374 feet long extending 20 feet below the water line and containing 5,200,000 feet of lumber recently left Portland, Oregon, for San Francisco. Four tugs were required to tow it down the Columbia river to the ocean. The success of the venture has not yet been announced. Many attempts to tow rafts from Puget Sound to San Francisco have been made but, they have all proved failures, so far.

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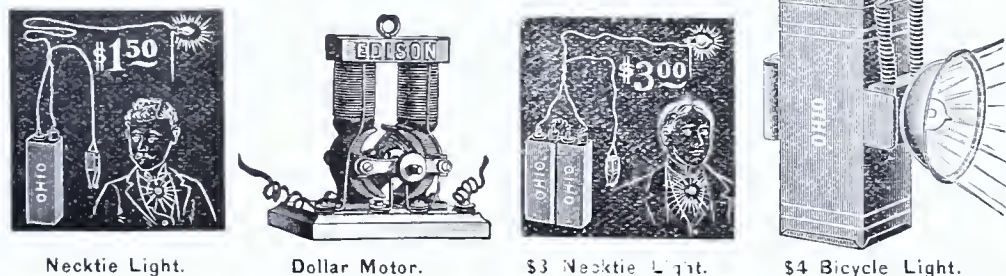
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2. Whether to place it in the hands of "selling agencies," or keep under the control of the patentee.
3. Whether to take out a patent on the invention in Canada and one or more foreign countries.
4. Whether there is any danger of the patent infringing others or of being infringed.

**T**HESE QUESTIONS every inventor should be able to decide understandingly, without seeking legal advice. Each and all of them are subjects upon which the patentee is liable to make mistakes at the very beginning of his efforts to advance the patent to a paying issue. These mistakes not only cause unnecessary trouble, delay and expense, but are liable to endanger the value of the patent, and in some cases actually shorten the term of seventeen years for which the patent is granted. This book will tell you what these mistakes are and how to avoid them; how to overcome the difficulties that must be encountered in trying to sell the patent, or starting and continuing the manufacture under it; how and when to obtain a legal foreign patent, and the reason why infringement suits are so often encountered by patentees.

### SYNOPSIS OF CONTENTS---Patented Inventions.

1. Average number of patents which pay the inventor. Co-operation of capitalists indispensable, and how obtained. The three necessary requirements for the success of a patent. The mistakes liable to be made at once by the inventor. How to classify and treat communications received. Time to allow for bringing the patent to a paying issue. The financial requirements to be met by the inventor.

### Expert Searches and Opinions.

The first objection usually made by manufacturers to every invention. The first step to be taken by the inventor after the patent is allowed. First mistake to avoid.

### Patent Agencies.

Their communications to patentees, with different methods of disposing of patent rights. The reasons why inventors should find out the character and business standing of an "agency" before entrusting their patents to them. The frequent results of neglecting this precaution. Two courses to pursue to obtain a reliable guarantee of trustworthy methods.

### Foreign Patents--Peculiarities of Laws of the Various Countries.

Why inventors should post themselves upon the patent laws and requirements of Canada and foreign countries before trying to duplicate a U. S. patent. How differing from the patent laws of the U. S. Reasons why other patent laws cause many Canadian and foreign patents issued every year either invalid or worthless; or act in shortening the life of a U. S. patent. Illustrations of court decisions in some important patent cases. Total cost of obtaining and holding a foreign patent for the full term. The annual tax imposed. Law of compulsory manufacture. Law against importation of the invention. Trade-marks in foreign countries. Tabular statement of fees and requirements for each country.

Five chapters treat specifically the laws, requirements and fees for obtaining and holding a patent in Canada and the leading countries of Europe. The different ways open to the inventor for working or disposing of a patent in these countries, with the several restrictions.

=====

### Selling or Developing a Patent---Selling the Entire Right,

Two mistakes liable to be made by the inventor in his first efforts to bring the patent into general notice. Why they may cause either a depreciation in the value of the patent or the absolute loss of the patent right. Course to pursue to effect a legal and valuable sale of the patent. The first steps to be taken by the inventor. The three obstacles to be prepared to meet. The principal objection usually made by capitalists to every new invention. The four principal points they will take into consideration in reference to the purchase of a patent. How the inventor can prepare himself to answer these objections. Kind of inventions that sell the most quickly. Different ways of settling the amount of purchase price by manufacturers. Form of assignment of the entire interest.

### Selling the Right to Manufacture a Patented Article; or, the Use of a Patented Process---State Rights---Form of Licences.

Under what conditions this course is to be commended, and when not to be. Form of assignment of state or territorial interest.

### Assigning to Manufacturers, With Royalty to the Inventor.

The meaning of royalty. The amount paid on different kinds of inventions. When the payment of royalty can legally stop before the time specified in the contract. The contract as affecting the interests of the inventor and manufacturer. Contingencies to be provided for in the contract by the inventor. When legal action can be brought to enforce the terms of the contract. Forms of licenses, exclusive and not exclusive, with royalty.

### Manufacturing by the Inventor; or, Selling Minority Interests Before Starting the Manufacture.

Kind of inventions that can be manufactured by the inventor and placed on the market with small risk. How to test the probable demand. Examples of successful manufacturing by inventors. The companies that make a specialty of manufacturing small inventions. Cautions to be observed. Two ways in which more complicated inventions can be manufactured by the inventor. Examples.

### Organization of a "Stock Company" to Advance the Manufacture or Use of a Patented Invention.

Two methods given by which financial risk may be made small enough to induce capitalists and business men of limited means to invest in shares for the manufacture or use of a new article or process under a patent. The names of factories, and where found, conducting a successful business with capital raised on one of these plans. When infringement suits develop in a "partnership" who are legally liable. Meaning of assignments, grants and licenses.

### Infringement of Patent Rights.

Why a patent gives uncertain protection to an inventor. How decisions of the Patent Office can be set aside by the courts. What constitutes an infringement. How to determine the infringement of a patent. Those who can bring action for an infringement. Those who are liable for infringement. Infringement of patents specifically classed under four heads, general rules defining infringement under each.

### Re-issue of Patents.

The four faults in the original application which makes patents re-issuable. Who can apply for a re-issue, and when.

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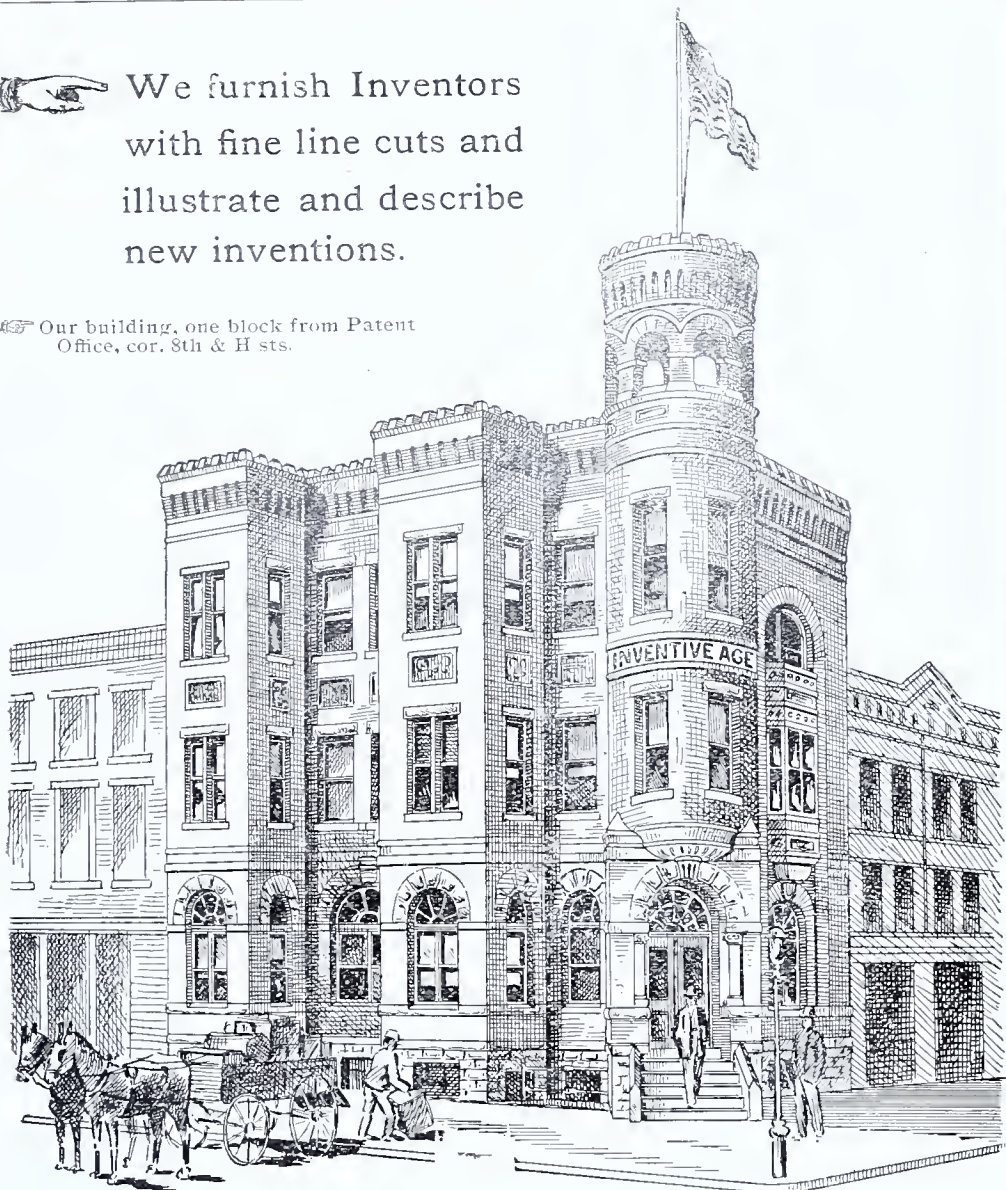
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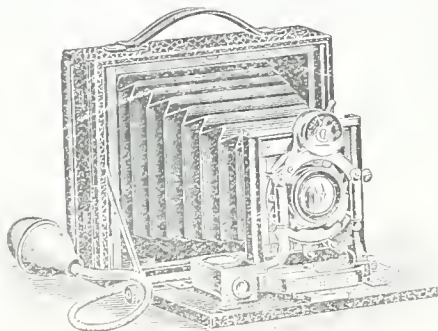
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When a United States naval vessel goes to sea she is something of a floating observatory, carrying in her navigating equipment many instruments but little known to the average landsman. The scientific outfit includes quadrants, sextants azimuth compasses, chronometers and other time pieces, ordinary compasses and other means of determining the exact position at sea and guiding the ship in any desired direction.

With the aid of a sextant or quadrant for measuring the altitude of heavenly bodies above the horizon, or their distance from each other, a time-piece to mark the instant of observation, a chronometer to show the time at the first meridian, a nautical almanac and an azimuth compass, a navigator can easily determine his position in any portion of the trackless sea as readily as a traveler can find his way by the guide-post that points out the country road.

A number of the many instruments employed by the navigator in his work, are used for purposes other than observing heavenly bodies. In port he is often required to make surveys of harbors, coast lines, etc., and to find the exact position of channels, shoals rocks and all other things that have to do with a vessel's passage or anchorage. The navigator has charge of all the weather indicators on ship-board, and makes a quarterly report of all meteorological observations. These are taken at regular intervals by the quartermasters of the watch, and are entered upon the ship's log. It is also the navigator's business to inspect daily the steering gear, compasses, anchors, and chain cables of the vessel and report upon their condition. He also keeps a book, in which are recorded all calculations concerning the navigation of the vessel, and at the end of the cruise this book is sent to the Bureau of Navigation.

These are a part of the duties of the navigating officer of a United States naval ship. His work is of the most important character, and its effectiveness is due in a large part to the perfection of the scientific apparatus which he uses. These are as near perfect as mechanical skill can make them. The compasses and chronometers are particularly carefully treated after they leave the hands of the manufacturer, for they are extremely sensitive to certain influences, and upon their accuracy much depends.

The important work of correcting defects in these

last mentioned instruments of navigation is done at U. S. Naval Observatory. Here the compass is tested in the Magnetic Observatory, where the magnetic wave current is noted in all its various phases, and photographed in a most interesting manner—by means of sensitive, oscillating needles, reflecting mirrors, and clock-work moving sensitized paper; and here the chronometer is also tested and put through the perfecting process. The latter consists in subjecting the chronometers to extreme degrees of heat and cold, thus fitting them for use in any climate.

The "copy" for that publication so useful to navigators (the Nautical Almanac) is made at the Observatory, where for this work, planets and stars are watched through great and small telescopes, and their ordered wheelings through space marked in the various stages of their progress. Records of

moon, magnifies its diameter six hundred times. This instrument has a ten-inch lense, weighs about two tons, and is swung upon an iron pedestal. Inside the pedestal are weights attached to wire cord which winds around a drum and moves the clock-work that keeps the telescope steadily following star or planet as the latter moves through space. Leading up the pedestal to the numbered gage-wheels near its top, are one-inch tubes containing reflectors which are aided by minute electric lamps placed at the top of the tubes. When reading figures the observer simply looks into the horizontal portion of the tube at the glass in the first lower joint. Across the larger lense of the instrument are stretched very fine spider webs, placed at right angles to form accurate squares. At one side of the room is a chronograph run by clock-work. Above, and almost touching the chronograph an automatic arm holds a pointed glass bulb containing ink and making a series of dots. When the observer desires to record the position of a star at a point within the field covered by the webs he touches a key, which is attached to a board connected with the chronograph by an electric wire, thus making the inking bulb skip a dot and leaving a blank space, which is the record.

The great equatorial telescope, shown in the cut on page 109, occupies a large iron roofed building (here shown) to itself. The mechanism of this big star catcher is of the same nature as the smaller equatorial, but on a much larger scale. But there is one peculiar difference: with the smaller instrument, you climb a ladder when the eye-piece gets above your head; with the larger, you stand still and let the floor take you up. When this ponderous mass of brass is brought to a horizontal position to catch the moon as it rises above the horizon, its eye-piece is about twelve feet above the

floor. But a signal to the engineer starts the hydraulic machinery and up comes the floor.

The big equatorial instrument is 32 feet long, its object-glass is 26½ inches in diameter, and up to 1873 it was the most powerful telescope of the kind ever made. Its magnifying capacity is 18,000 diameters, and with its base it weighs six tons. Without the additional expense of a new building, movable floor, hydraulic and steam machinery, this telescope has cost the government \$47,000; the large lense alone cost \$30,000. The big government star-catcher has the honor of the discovery of the moons of Mars, the planet which has had much public attention.



EQUATORIAL TELESCOPE HOUSE.

earthquake shocks are made by means of a seismoscope and a seismograph kept in a small building in the Observatory grounds, and the erratic comet has attention paid to it through the agency of a comet-seeker designed for finding those uncertain visitors. The Observatory keeps "tab" on time in the most perfect and systematic manner and through its electric time-service system transmits its time-message at 12 o'clock each day to the Western Union telegraph office and thence to clocks in various parts of the country.

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WASHINGTON—NEW YORK, AUGUST, 1898.

A NEW SPRING has been discovered in the petroleum district at Baku, India, producing 500,000 pounds of naphtha daily.

A COTTON mill in China is now turning out 100 bales of cotton yarn in a working day of 21 hours. In this mill 800 women and 600 men and boys are employed.

A SMALL portion of the space allotted the United States at the Paris Exposition could be most instructively and interestingly used for exhibiting models of American cannon and of Sampson's and Dewey's ships.

THE exploding of the sub-marine mines in the Potomac River, by the controlling switchboard, at Fort Washington, being struck by lightning, should cause inventive genius to provide some method for preventing such an accident.

THE total distance travelled by the battleship Oregon during her famous trip from Puget Sound to Jupiter Inlet, was 14,510.9 knots, which were made at an expense of 3,900 tons of coal. The time consumed on the trip, including all stops, was 79 days.

UPON taking up the mines at the mouth of the Cape Fear River, N. C., it was found that one of them contained a large indentation. This, it is supposed was made by contact with a merchant ship. Why the mine was not exploded has not been explained.

A SUBSTITUTE for rubber is now being made from corn, and is said to possess all the good qualities of the Para article. The artificial product is gotten from the oil extracted from the corn, which is condensed, mixed with a certain proportion of pure rubber, and then vulcanized.

THERE has been made between Belgium and Japan an arrangement whereby Belgium subjects in Japan and Japanese subjects in Belgium will in patent matters reciprocally enjoy the same protection as other nations by carrying out the conditions prescribed by the law of their respective countries.

UNCLE SAM is advised by a European journal to adopt for his guns the highly rated, and undoubtedly good, cordite or smokeless powder. It is very probable that the United States would profit by taking this advice. But in view of recent events, it is plain to all that with the employment of the old smoke making powder we have little trouble in "getting there" in a manner that Europe has never approached.

## The Paris 1900 Exposition.

President McKinley has appointed Honorable Ferdinand W. Peck of Chicago, Commissioner General to the Paris 1900 Exposition. Mr. Peck's well-known reputation as a successful business man and organizer brought him to the front during the famous Chicago World's Fair. He displayed marked executive ability in his official capacity in connection with the Exposition department; and it goes without the saying that if the exercise of energy and ability combined with ripe experience shall constitute the elements necessary to have the United States comprehensively represented at the Paris Exposition, Mr. Peck will unquestionably fill the bill.

Commissioner Peck's general headquarters will be located at Chicago, with offices very likely maintained at New York and Washington, in order to accommodate manufacturers and others in the coast-wise States, and to properly look after such duties as may develop upon the Commissioner General in connection with the governmental exhibits.

The act of Congress in reference to this Exposition provides that the President shall appoint a Commissioner General who shall, under the direction of the President, make all needful regulations and rules for the proper representation of the United States upon this occasion. The President is also empowered to appoint an Assistant Commissioner General and a Secretary. The former is to assist the Commissioner-General and act in case of the former's death; the Secretary shall perform such duties as may be designed by the Commissioner-General and act as disbursing officer. The President is authorized to appoint twelve additional commissioners, who shall be subject to the control and direction of the Commissioner-General. These twelve commissioners must serve during the entire year 1900 and receive an allowance of \$3,000, which shall be in full for all compensation and travelling expenses.

The Secretary of Agriculture is authorized by the act to prepare suitable exhibits of agricultural products of the States and Territories, and to exhibit the same under the direction and control of the Commissioner General. For this purpose the maximum sum of \$75,000 is appropriated.

The officers and employes of the executive departments of the government and of the Fish Commission and the Smithsonian Institution, are permitted to allow such exhibits to pass out of their possession and be transported to and from the Paris Exposition as the Commissioner-General may request.

The Commissioner-General is authorized to employ such number of experts as may be needed; said experts shall have special attainments in regard to the subjects of the group or groups in said exposition for which they have been selected; and the Commissioner-General may also employ, temporarily such other experts as may be necessary to properly collect and install exhibits.

The act appropriates \$650,000 to cover all expenses incident to the work, which amount is entirely inadequate and all out of proportion with the sums expended by important European countries at the Chicago World's Fair.

## American Genius and Enterprise.

The great wheel of human progress from the time that found this country free and independent has been rolling onward, fulfilling the magnificent destiny of the grandest of all governments, until today we can say, in the first words that were ever flashed over an electric wire: "What has God wrought." Aye, what has He wrought for the American Republic. We stand today a giant among the nations of the earth, flushed with victory over a despotic and cruel kingdom, with much of its fair possessions within our grasp. Thousands of square miles of foreign territory are to be added to our national domain, and the great blessing of a free people (liberty) is to be given to thousands who have heretofore known but oppression, while

lessons of thrift and enterprise are to be taught where poverty, superstition and ignorance have held sway for centuries.

And what has caused our remarkable success in this our latest war? To inventive genius and to the immense natural possibilities of our country can this be attributed. Wherever there was a need of developing a natural resource, invention has supplied it, and pushed on the wheel of progress to wealth and power. When ships and their equipments were to be constructed, the inventive idea was at hand for their perfection. They contained the best of scientific apparatus for navigating, range-finders, etc., etc., and their crews were instructed after the most scientific methods.

Years ago millions of men and women seeking liberty and sustenance came to our free shores; they came from many lands, and from the mingled blood of their posterity a sturdy race has risen, individual, to the country born, and making the best human product that nature can give to earth—the true American citizen.

These are the people who have made our glorious country; and of these are the men who so effectually and quickly whipped the Spaniard. And when the dove nests in the mouth of the cannon in the land where the Spaniard oppressed and robbed—the sons of freedom and enterprise will make the wilderness there blossom like the rose. Cuba, our neighbor, which will sometime be a part of our national domain, on account of its proximity to our shore, will receive especial attention from the progressive American. The latter will surprise and astonish the indolent Latins with his energy and indomitable spirit. The cities and towns of Cuba will take on new life such as was never seen there before. Manufactures will spring up as if by magic, railroads will find their way to all industrial places of the island and to the virgin forest where rare and valuable woods are waiting for the axe and the factory; street cars will ramify the cities, and the hum of the electric motor and dynamo will sing the story of progress, peace and plenty. The great sugar industries will with an immensely larger output, claim millions of capital and the labor of thousands of employees, and this with the product of many other paying enterprises, will bring to the Queen of the Antilles a continuous stream of gold and cause her harbors to be alive with the ships of many nations. And it is safe to say that of national colors the Stars and Stripes will be the most frequently seen there, and the most heartily welcomed.

## An English Opinion.

Mr. Henry L. Norman the English journalist in an article entitled "America Revisited in War Time," published in *McClure's Magazine* for July, says in speaking of inventions in this country:

"The observant visitor to America must be impressed first with the remarkable development of what may be called applied intelligence. Not only is there an extraordinary fertility of invention, but also, what is perhaps more striking still, there is apparently an instant readiness on everybody's part to make use of the things invented."

This is a true statement of the fact.

The American inventor is continually striving to meet every necessity of the human,—and when possible creates the necessity—and the American citizen, who always knows a "good thing" when he sees it, is not slow in putting it to use. He is not content to walk when he can ride, and when he rides he desires the best vehicle obtainable, and one that is not slow. He does not believe in travelling in the ruts of his forefathers, for his ambition is to keep up with the progressive procession, as those near the dawn of the 20th century should.

The largest cyanide mill in the world, the Golden Gate, at the Mercur mines in Utah, is operated by electric power, which is transmitted from the generating plant, a distance of 33 miles, to Mercur, at a potential of 40,000 volts.



### The X-ray in Warfare.

In conducting war everything that can in any way make the suffering of the wounded less should be employed when possible. The surgeon should be given all necessary help and all required scientific apparatus peculiar to his profession. And in this connection the X-ray should be considered of paramount value. With it the course of a bullet in the human anatomy can be traced, an estimate of the damage it inflicts and the proper treatment at once begun. Thus life and limbs may be saved and guess-work (which is often the case in hurried diagnosis) abandoned.

At first thought it might seem impracticable to carry an X-ray apparatus about with an army, through field, woods, etc. But the idea is easily carried out. An outfit of this kind should not weigh more than 100 pounds, and a number of the machines could be carried to any place to which troops could be marched. On shipboard they could be employed to the utmost advantage, for there every convenience for operating the apparatus can be obtained; the plant can be stationary, and, as would be impossible in the army, the storage battery for furnishing electric current, could be dispensed with.

### Australian Diamonds.

Although considerable numbers of diamonds are continually being found in Australia, chiefly in New South Wales, the true matrix has never been discovered. In that colony there is evidence in every case to show that the stones were drifted from their original matrix to the places where they were found, but up to the present its locale and nature remain unknown. When both have been ascertained, it is probable that New South Wales will become one of the leading diamond-producing countries of the world; but the work of prospecting is difficult, tedious, and costly, by reason of the mountainous character of the country in which gems are principally found. The finest stones, yet known were obtained several years ago from the Cudgegong river, rising in the Australian Alps, and running through auriferous country in the northwestern portion of the colony. No regular search is being made at the present time for the stones, the gold-mining industry being found of a more certain and remunerative character; but at Bingera and other portions of the New England district, in the northern portion of the colony, diamond mining is actively carried on, the stones generally being small, and many "off color." Others of the same kind are found at Inverell, in the same country. Not a few of the stones obtained at either place would be classed as first water by the expert, being white, clear, bright, and free from speck or flaw; but their extreme hardness makes the cost of cutting expensive in proportion to their size. Considerable numbers of diamonds from Bingera, Inverell, and other places are annually sold in Europe, the larger stones bringing good prices. Thus, a Bingera diamond which, when cut, weighed slightly under a carat, was disposed of in London for £14. 10s. 5d.; another, with a greenish tinge, weighing over half a carat, when cut, bringing £10. The stones average about four to the carat in their rough state, the prices realized being from 4s. 9d. to 5s. per carat. For diamond drills and similar industrial purposes, the New South Wales stones are simply invaluable, and are preferred to those of other diamond-producing countries. At Mittagong, between 70 and 80 miles south of Sydney, diamonds are found in a drift, associated with other gems. Some of the stones are of a much deeper tinge than the straw color which makes them "off," and are regarded as having a peculiar beauty of their own as yellow diamonds. In 1885 some good diamonds were found in one of the Western gold districts, where some alluvial mining was being carried on, at a depth of from 20 to 50 feet. One of the stones, capable of being cut into a first-class brilliant of four carats, was sold for £75. Although diamonds are met with in numerous places in New South Wales, often many miles apart from each other, their sources remain undiscovered to this day. The abraded appearance of the stones generally shows that they must have travelled a considerable distance, although their extreme hardness has caused the signs of abrasion to be less conspicuous than in Brazilian and other diamonds. It is believed that the matrix of the Bingera and Inverell diamonds will be found somewhere near the Great Dividing Range, and that as it is approached the stones obtained will increase in size. The ancient river bed down which they were carried has yet to be dis-

covered. An effort was recently made to sink on the "deep ground," but when the basalt has been pierced, and the under rock penetrated to a depth of 100 feet, the death of the enterprising promoter stopped further operations. It is possible that they may be resumed in the near future, when, if successful, they will do much to enhance the reputation of New South Wales as a diamond-producing country.—*Invention*.

### Aurora Borealis and Magnetic Storms.

The faint luminous arch seen at times in the night low down in the northern sky is the aurora borealis, or northern lights. Below the arch is what is known as the dark segment. The lower line of the arch is often irregular in outline, but is always well defined, showing a sharp separation between light and darkness.

During auroral displays there is a disturbance of the magnetic needle, causing it in middle latitudes to swing in half an hour three or four degrees, in extreme cases, from its average direction. The horizontal force of the earth's may change in the same time by one-ninth of its whole amount. These disturbances of the needle occur at very nearly the same time at places hundreds of miles apart. When the auroral light is rosy colored, the magnetic distances are said to be greater than when white. Such disturbances of the needles are also strong electric currents in telegraph wires and cables, interfering with their working. These may be due to earth currents or may be induced currents in the wire due to atmospheric conditions.

The aurora has many of the appearances produced by the passage of electricity through rarefied air tubes. There is great uncertainty about the height of the aurora above the earth. The aurora may be such a phenomenon as the rainbow, for which every vision makes its own, and for which no height can be assigned. Various estimates and alleged measurements of the height vary from half a mile in the arctic regions to forty miles above the temperate zone, for the lower edge of the arch, as high as 100 or 150 miles.—*Meteorology by Thomas Russel*.

### Women Street-car Conductors.

The experiment undertaken on June 13, when the Chillicothe, Ohio, Electric Street Railway Company installed seven young ladies as conductors on their cars, has been fairly tested, and has proved a greater success than the management of the road had dared to hope it would. That such an innovation was tried was the result of a peculiar combination of circumstances. It was found that a great many people were riding on the cars without depositing a nickel in the boxes provided to receive the fares. It was also found that the receipts of road would not justify the employment of conductors at the wages usually paid those functionaries, although conductors were manifestly needed. While the management of the road was vainly endeavoring to find a way out of this dilemma, the superintendent, Mr. Joseph P. Myers, suggested that young ladies be employed, as they would be willing to work for less money and, on a small line like that at Chillicothe, could probably do the work equally as well as men.

In answer to an advertisement inserted in a local paper over 100 women applied for position. From these, seven were carefully selected. They are all of good family and of personal attractiveness, and since they have undertaken the work have found few unpleasant features connected with it. They receive \$4 per week, are on duty nine hours a day, and have one day off in every week. They claim that the work is much to be preferred to any of the indoor occupation open to women. They have adopted a neat and serviceable uniform.

The management of the road has also good reason to be pleased with the experiment. Since the new conductors were placed on the cars, the receipts of the road from fares have increased an average of 30 per cent.—*Electrical Review*.

### Hot Oil in Sterilizing.

The Hospital extols the virtues of hot oil as more efficient than boiled water in sterilizing instruments, especially syringes. Olive oil at a temperature of 320° to 356° F. acts very quickly and with great power. To obtain complete sterilization of the instruments, it suffices to dip them for an instant into the hot oil, and in the case of syringes it is sufficient to fill them twice with oil at the temperature mentioned. The temperature of the heated oil may be determined by a thermometer, which certainly is the scientific way, but Prof. Wright, of the Netley Hospital, in England, suggests the very crude but rough and ready method of dropping a bread crumb into the oil, which becomes brown and crisp as soon as the required temperature is obtained.—*Scientific American*.

### How Mica is Obtained.

The mica trade is controlled practically by three or four large concerns in New York, Chicago and Boston. These houses have an agent who buys for cash whatever mica is brought by the miners. They control the market, and fix the prices to be to be paid to the miner, as well as the prices for which it was sold in the markets.

Mica, it need hardly be said, is a very valuable, almost precious, mineral, as those who are obliged to buy a small strip for their stove doors will testify. A package worth hundreds of dollars can be carried in a basket slung over the arm, or in a pair of saddlebags on horseback. When prepared for the market the solid block, as taken from the mine is split into sheets. These are cut into squares or rectangles of almost every possible size, from 2x2 inches up to 8x10 inches, and sometimes even larger. There are no less than 183 regular sizes kept in stock by dealers.

The mining of mica is the poetry of mining. It is impossible to conceive of a more exciting and fascinating employment. The vein of mica-bearing quartz, lying between rocks of different formation, has been found. The cap rock has been blasted away. Little "niggerheads"—small lumps of crumbling mica mixed with slate and other rock—are growing plentiful. The rock is carefully examined by the experienced miner, and all indications are that mica will soon be found. A blast is made. The rock and debris are cleared away, and there in the bottom is a block of the precious stuff, a ragged corner showing itself black and glittering in the white quartz in which it is embedded. With the tips of the fingers the miner gently and affectionately brushes away the dirt and small stones which partly cover it. Its thickness is carefully noted, its position in the rock is learnedly discussed, and many a speculation indulged in as to its size and quality. The hole is quickly drilled, the small blast is made, just loosening the rock, and all eagerly crowd around as one of the men with his pick pulls away the broken stone. There it lies, a black, glittering mass, nine or ten inches across its face, three or four inches thick, and irregular in shape, as all blocks of mica are. A good-sized block, and, if solid and of a perfect cleavage, will be worth several dollars. The excitement is not allayed, however, and will not be until the block is split open and we know how it looks on the inside. It is a very bad thing to split open a block at the mine, and contrary to all rules, for there is danger that the fine, polished faces will be scratched.—*Age of Steel*.

### Our Foreign Commerce.

In 1898 the United States completed the most notable year in the history of its foreign trade. In the fiscal term ended with June the exports of merchandise amounted to \$1,231,311,000, which compares with \$1,050,993,000 in the fiscal year 1897 and \$1,030,278,000 in 1892, the only year in which exports have exceeded \$1,000,000,000. With so remarkable an increase in exports, imports or merchandise decreased, and the excess of exports over imports reached \$615,259,000, which is more than twice the largest favorable balance ever before recorded in our commercial annals.

Exports constitute the surplus of a country's production over the indispensable provision for home consumption. They represent the surplus wealth of a nation. After deducting the entire sum of our imports there remains in favor of the United States a balance of \$615,259,000. In the last two years this balance amounts to \$902,522,000, and in the last five years to \$1,218,117,000.

The cause of the great increase in exports is to be found in the abundance of our crops and scarcity of yields in other grain-producing countries, resulting in higher prices for cereals. The value of our exports of wheat in 1898 was \$145,821,000, against \$59,920,000 in the preceding year. The average export price of wheat last year was 93 cents and in 1897 it was 75 cents, while the number of bushels exported was 148,431,000 in 1898, as compared with 79,562,000 in 1897. The value of wheat exports in 1898 has been exceeded only in 1892, when the export price was \$1.02 a bushel, in 1881, when the price was \$1.11, and in 1880, when the price was \$1.24. The exports of corn were valued at \$20,200,000 more than in 1897. The total exports of all breadstuffs were \$333,750,819, an increase of \$135,893,000 over the preceding year. The largest total recorded before was \$299,363,000 in 1892.

Dry goods and jobbing houses of St. Louis sold more than \$30,000,000 worth of goods in the Southwest and Mexico last year, and it is estimated that this year's sales will reach \$45,000,000.



### Some Accidental Inventions.

An Augustinian monk, Berthold Schwartz, having put a composition of sulphur and saltpeter in a mortar, it took fire, and the stone that covered it was blown off with great violence, which accident led the chemist to think it might be used to much advantage in attacking fortified places. He accordingly added to it a quantity of charcoal to render it more apt to take fire and increase combustion.

Leaden shot are attributed to a Bristol plumber, who, one night about the year 1783, "had a dream which was not all a dream" that he was out in a shower of molten lead, which fell in the form of spherical drops. His curiosity being aroused, he went next day to the top of the church and poured some melted lead into a vessel of water lying below. To his great delight, he found that the lead had gathered into beautifully formed globular balls, and he at once took out a patent.

A Nuremberg glass-cutter happened to let some aquafortis fall upon his spectacles, and noticed that the glass was corroded and softened where the acid had touched it. Taking the hint, he made a liquid, then drew some figures upon a piece of glass, covered them with varnish, applied the corroding fluid, and cut away the glass round his drawing. When he removed the varnish the figures appeared raised upon a dark ground; and etching upon glass was added to the ornamental arts.

One day nearly three hundred years ago, a poor optician was working in his shop in the town of Middelburg, in the Netherlands, his children helping him or amusing themselves with the tools and objects lying about, when suddenly his little girl exclaimed: "Oh, papa, see how near the steeple comes!" Anxious to learn the cause of the child's amazement, he turned toward her, and saw that she was looking through two lenses, one held close to her eye, the other at arm's length; and calling her to his side, noticed that the eye lens was plano-concave, while the other was plano-convex. Taking the two glasses, he repeated his daughter's experiment, and soon discovered that she had chanced to hold the lenses at the proper focus, thus producing the wonderful effect that she observed. His quick wit saw in this a wonderful discovery, and he at once set about making use of his new knowledge of lenses. Ere long he had fashioned a tube of pasteboard, in which he set the glasses at their proper focus, and so the telescope was invented.

Among the many traditions concerning William Lee and the stocking-frame is one that he was expelled from the university for marrying, and that, being very poor, his wife was obliged to contribute toward the housekeeping by knitting. It was while watching the motion of her fingers that he conceived how to imitate those movements by a machine.

Arkwright accidentally derived the idea of spinning by rollers from seeing a red-hot bar elongated by being passed between two rollers.

The ordinary practice of taking a bath solved for Archimedes the question of how to test the purity of the gold in Hiero's crown. He observed that when he stepped into a full bath the quantity of water which overflowed was equal to the bulk of his body, and it occurred to him that the worth of the crown might be tested by such means. He thereupon made two masses of the same weight as the crown, one of gold, the other of silver, and immersed them separately in a vessel filled to the brim, measuring exactly the quantity of water that overflowed in each case. Having found by this means what measure of the fluid answered to the quantity of each metal, less in the case of the gold than of the silver—the bulk of the former being less, weight for weight—he next immersed the crown itself, and found that it caused more water to overflow than the gold, but less than the silver. Having found the difference between the two masses of pure gold and silver, in certain known proportions, he was able to compute the real quantity of each metal in the crown, and thus discovered the fraud that had been practiced on the king, to whom he hurried exclaiming, "Eureka! Eureka!" (I have found it! I have found it!) an exclamation that has ever since been used to express exultation over a discovery.

Coming down now to our own time, the account of the discovery of saccharine, one of the numerous by-products of the gasmaker's refuse, whose sweetness is three hundred times more intense than that of cane sugar, reads almost like a romance. Dr. Fahlberg had entered the John Hopkins university in America in order to devote himself exclusively to a study of the chemistry of coal-tar derivatives. Some months had passed, when one evening at tea-time he detected an intensely sweet flavor upon his bread and butter. He traced the sweetness to his fingers, to his hands, and to his coat-sleeves; and it dawned upon him that it must have been derived from one of the new compounds which he had that

day succeeded in producing. He promptly returned to his laboratory and tasted the contents of every vessel with which had been working. His idea was correct. One of beakers contained the sweet material.

Professor Rontgen came upon his marvelous X-rays—which have opened out new fields of research in physical science, besides being of far-reaching practical utility in surgery and other departments—quite by chance. He was experimenting in the dark with a Crookes vacuum tube which was covered with some sort of cloth. A strong electric current was passed through it, while close by was some prepared photographic paper, but no camera. Next day he noticed several lines on this paper for which he could not account. By restoring everything to exactly the condition as on the preceding day, he was able to ascertain the real origin of these mysterious marks.—*Chamber's Chronicle*.

### Smokeless Powder.

Smokeless powder can now be carried with perfect safety, and it has many points in its favor. The discharge of the old powder is accompanied with enormous volumes of dense, opaque smoke, whereas the smokeless powder produces only a faint mist which quickly disappears. The one produces a large amount of residue which fouls the gun, the other produces but little residue and leaves the gun practically clean for the next round. The smokeless powder is far more powerful weight for weight, the charge of powder for the 12-inch gun weighing 425 lbs., whereas the charge of cordite weighs only 167½ lbs. Smokeless powder burns very slowly, giving off its gases gradually, maintaining a fairly even pressure throughout the whole bore, thereby attaining a high muzzle velocity with a comparatively low maximum pressure in the gun; whereas the brown powder burns more quickly, producing a less uniform pressure throughout the travel of the bore. Fifteen tons to the square inch is the limit of pressure which our guns are designed to stand in service. With brown powder this pressure is reached at the instant of firing, the charge is less gradually converted into gas, and as the projectile travels along the bore the pressure rapidly falls, owing to the increased volume of space behind the shot. With the smokeless powder, a much higher velocity is obtained without exceeding the normal pressure of 15 tons. This is due to the fact that the powder burns more slowly, more gas behind being given off as the shot travels along the bore. The pressure is maintained at a high level up to the time that the projectile leaves the muzzle, and consequently the velocity is proportionately increased. By the use of smokeless powder, the muzzle velocity could be increased from 400 to 500 feet per second without exceeding the safe maximum pressure for which the guns were designed. That means a more level trajectory and a greater penetration. When to these advantages are added a smokeless discharge, and the ability of the gunner to see where the projectile strikes, the immense superiority of the smokeless powder is manifest.

### Cost of War.

The heaviest war indemnity of modern times was, of course, that paid by France at the close of the war with Germany. The hostilities lasted over eight months, and the total cost of the war was estimated at \$1,580,000,000. Beside the cession of Alsace and Lorraine, France had to pay Germany five milliards of francs (\$1,000,000,000) in instalments which were allowed to extend over three years. The original demand of Germany was six milliards, or \$200,000,000 more. M. Thiers strove in vain to save Metz, but it was to his exertions that the reduction in the amount of the indemnity was due.

The cost of the Russo-Turkish war of 1877 has been estimated at \$945,000,000. Between the declaration of war by Russia and the treaty of San Stefano nearly eleven months elapsed. By this treaty the Porte admitted itself indebted to Russia in the sum of 1,410,000,000 rubles (about \$725,000,000) as indemnity for the losses and expenses of the war. The items in the account were as follows: Four hundred and sixty millions for war expenses, \$205,000,000 for damage done to the south coast of Russia, her export commerce, industries and railways; \$55,000,000 for injuries caused by the invasion of the Caucasus and \$5,000,000 for injuries suffered by Russian subjects and establishments in Turkey. In consideration of the financial embarrassments of the Ottoman empire, the czar consented to accept in substitution for about three-fifths of the total sum the various territorial cessions sanctioned by the treaty of Berlin. This left a balance of \$225,000,000 due to Russia by Turkey, and a part of it is still unpaid.

The latest and most lenient war indemnity was that levied by victorious Turkey on Greece last year.

The sultan was obliged by the great powers of Europe to cut it down to \$20,000,000, which was not a fourth part of what it actually cost him.

### COST OF AMERICAN WARS.

A few comparative figures taken from official records, will serve to put the great increase in cost of war as now conducted, with all the modern improvements, in a clear light. Our war for independence lasted eight years, and its cost is officially recorded as \$135,000,000, using round figures. There were about 310,000 troops engaged in that war—one-third more than have been called out in the present conflict with Spain. The war of 1812, which lasted two years and eight months, cost the United States a little over \$107,000,000, and to carry it on we put in the field 576,000 troops, nearly three times as many as we have now under arms.

The Mexican war, which lasted two years and three months, cost the American people \$100,000,000, and 112,000 troops were engaged in it. If the number of our troops who carried our flag victoriously to the capital of Mexico had been doubled, they would have about equaled the number of the army now in the field against Spain, and the cost of their two years and three months of operations would have been about \$200,000,000. From which it is a plain deduction that, with the same number of men under arms, a year of war in 1898 is about five times as expensive as was a year of war in 1846.

The cost of our great civil conflict has been put down at \$6,189,929,909, but this estimate includes all expenses growing out of the war, as well as actual cost of the military and naval operations. The direct outlay of the United States government in carrying on the war for four years was \$3,400,000,000, and in the course of the struggle 2,859,132 Union troops were engaged. It is estimated that the number of troops actually engaged on the Union side averaged 2,326,168 for three years. Hence it appears that the direct cost of the war; counting it on this three year's basis, was about \$1,466,000,000 per year. But Mr. Dingley has told us that it will cost \$500,000,000 to keep 200,000 men fighting Spain for one year, which is more than one-third as much as it cost the government to keep 2,326,000 men fighting the confederate states for the same length of time.—*Evening Star*.

### The American Navy.

The recent rapid growth of the American fleet and the extraordinary increase just authorized by Congress make it one of those which the world must reckon with hereafter. We had, a day or two ago, actually in commission, counting all sorts of craft, 73 vessels on the Atlantic Station, under Admiral Sampson; seven in Commodore Schley's command, 11 in Admiral Dewey's, six in Admiral Miller's Pacific Squadron, five in Commodore Howell's Northern Patrol Squadron, seven on special service, 42 unassigned, of which some were for coast defense; finally, seven training and receiving ships. Here is a total of 158 vessels in commission, with eight or ten more preparing for commission. They include many, like colliers, that are not fighting craft, and many torpedo craft and auxiliary cruisers, yet the aggregate of belligerent strength is certainly noteworthy. It is supplemented by 14 armed revenue cutters co-operating with the navy.

We are building five first-class battleships, namely, the Kearsarge and Kentucky, each three-fifths finished; the Alabama, 53 per cent; the Illinois, 46; and the Wisconsin, 38. We have six torpedo boats, the Rowan, the Mackenzie, the Dahlgren, the Davis, the Fox, and the Farragut, all over four-fifths completed; the submarine boat Plunger, three-fourths; the Craven, half ready, and the Stringham, goldsborough, and Bailey, less advanced. Authorized by the late act of Congress, but not yet contracted for are three first-class battle-ships, four monitors, 16 destroyers, 12 torpedo boats, and a lake gunboat. We must not forget, too, the sister ship of the New Orleans, completing for us in England.—*New York Sun*.

### How Stucco is Made.

Stucco is made by diluting very fine newly-baked plaster in a hot solution of white Flemish glue, so as to make a soft paste. Various coloring substances are added to the paste to imitate marble. These colors are the same as those employed for painting houses. When the mixture is dry it is polished with pumice stone and then with whetstone and tripoli. A final polish is given by rubbing it with a piece of felt and soapsuds and then with oil. With this imitation marble pillars, floorings, and children's toy marbles are made.—*Science Francaise*.

The total value of all our issues of gold coin from the establishment of the mint in 1792 to June 30, 1897, is \$1,883,958.



## The Inventor of the Monitor.

EDITOR OF THE INVENTIVE AGE.—In your July number I notice an editorial which seems to me to do great injustice to a man, who is acknowledged to have been one of the world's greatest inventors. I think in the exercise of what you call "the broad minded disposition of the American people to give credit where it is due" we ought to exercise a little care in discriminating between the fact and some newspaper writers statement of it.

Theodore R. Trimby may have been a great inventor, but I think he has not left any enduring monument of his greatness. That he had an idea which he endeavored to induce the government to adopt, is probably true; that the idea contained anything valuable is quite another question. I have looked through the patent office reports from 1845 to 1858 without finding any record of a patent for that idea, though I do find several to him (apparently) for improvements in water wheels. I do not say he did not have a patent but only that I did not find the record of it.

I very well remember the model of the iron fort, which used to stand in the vestibule of the Patent Office and may do so yet, and I have no doubt that it embodied all that the Herald man was talking about. That it was the progenitor of the Monitor is exceedingly unlikely, and in view of Ericsson's originality, and integrity of character, it may be set down as certain that, if he ever saw or heard of Timby's device, it did not influence him in the invention of the Monitor.

Timby's model was a solid iron structure, about 2 or 2½ feet in diameter and 20 or 24 inches high. It was circular and arched on top and had three or four stories of embrasures for cannon and a dozen or thereabouts on each story. At the apex there was a protective tower for the commander similar to those used on the turrets of the later monitors.

This whole structure, which if built full size would have weighed many thousands of tons, was pivoted and designed to be revolved.

It was also contemplated that the cannons could be discharged by electricity, controlled in his tower.

That Trimby had in idea, a revolving fort is true, but it seems to be equally true that he had no idea whatever of a practicable use for it—and no idea of any adequate reason for its existence. It was land fortification and as such, had no reason for revolution except the removal of a disabled portion and the substitution of a part not yet disabled.

The mechanical difficulties were probably considered out of all proportion to the probable advantage to be gained.

His case is not unlike many other inventors who have had conceptions of grand things without a glimmering idea of the physical conditions to be dealt with. An example occurs to me in Renwick's old reaper and binder, a machine in which one can find the germs of all that has since by other and more practical minds been worked over into the marvel of the 19th Century, a modern reaper and binder. If Renwick had had a conception of the conditions under which such a machine must work, he would have designed a structure which would require a dozen horses to propel.

In defining the place of an inventor the Supreme Court has said, "It is the last step that counts," not the first one nor any of the intermediate ones. It makes no difference what is the substructure of the inventor's design, it amounts to nothing for the public until the step is taken which enables it to accomplish the desired result. That is the step which counts.

Timby did nothing which was practical, and at the most he gave nothing to the public, unless it was a suggestion from which some other might make an advance toward utility.

In searching for the sources of Ericsson's inspiration it is much easier to find them leaving Timby out than to put him in the chain.

It was manifestly impossible to hang heavy armor on a wooden ship, but before 1860 the use of iron in shipbuilding had become common, and the idea of armor was as old as the use of the hammock netting. Hence when Ericsson attacked the problem of a warship he had before him a knowledge of the material, another idea of protection. The use of iron carried with it an added protection, and it did not require invention to recognize that two inches of iron would be less penetrable than one inch—or

to calculate that 8 inches would stop any projectile then known.

The revolving or pivot gun had long been known, and with an iron structure, and the idea of protectors, it was not a long step to an iron shield which should revolve with the gun. To group these ideas in a practicable structure was a part of what Ericsson did and it required genius of a high order to do it. But it was only a part of what he did. He originated a new type of war vessel and he not only did that, but he made that also practicable, and the whole product was not only in the highest degree successful in actual use but it revolutionized the naval structures of the world.

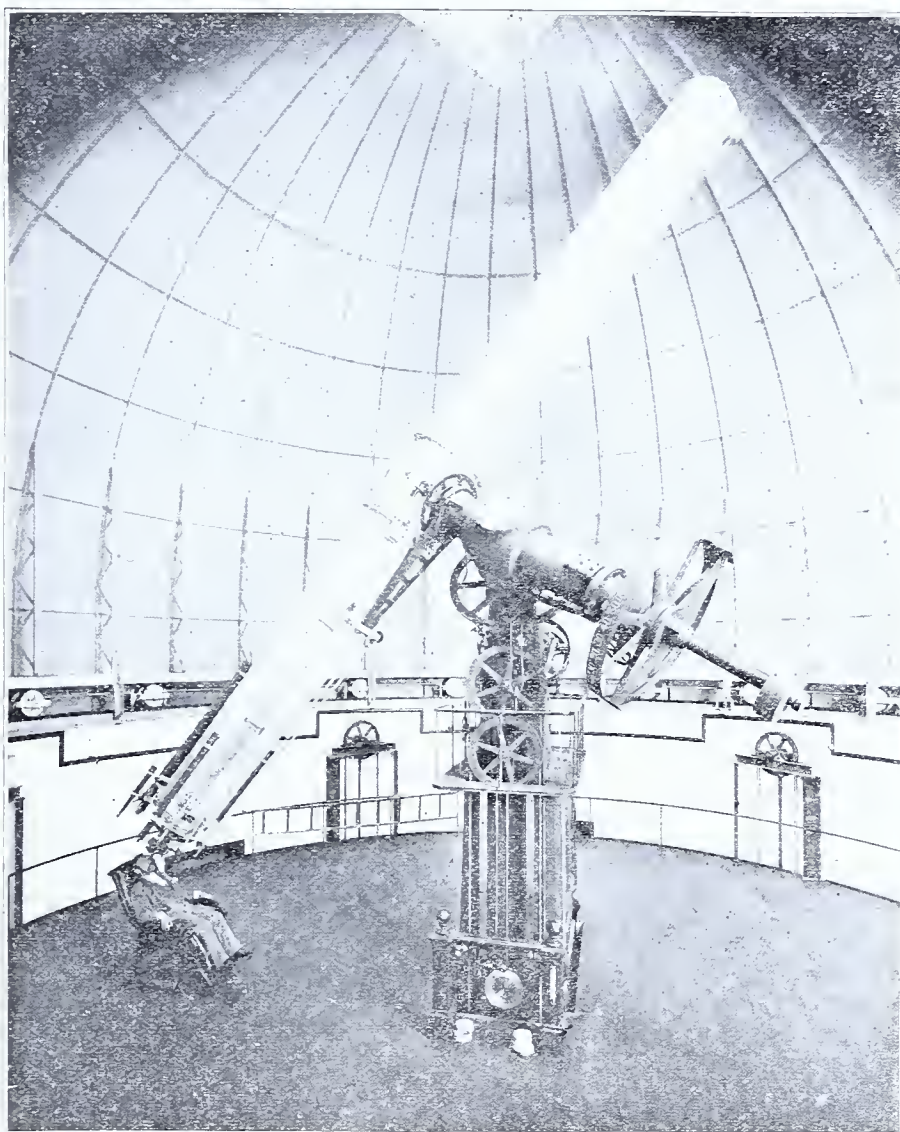
Any one who supposes that Timby ever had any conception of that, or anything which could lead to that, is prepared to deny credit to that other inventor who has shown us how to use the microscope to discover unknown features in the moon and stars.

Yours

R. D. O. SMITH.

## The Gas Engine as a Rival of the Steam Engine.

It is scarcely more than a few years ago that the gas engine was looked upon by engineers as of no practical utility except for small power, and then under special conditions. In such instances the extra cost of fuel was more than balanced by the avoidance of a boiler, and the less attention re-



GREAT EQUATORIAL TELESCOPE.

quired. For the purpose named the gas engine has a very respectable backing and it stands its ground firmly today. It was not till still later that it was thought to be practicable to employ it for power of 100 to 200 horse power, as it is being employed at the present time.

While it does not seem probable that the gas engine will, for large powers, supercede the steam engine or become a formidable rival, it is but fair to say there is a possibility of its doing so for the following reason:

While it is true that heat and mechanical work are mutually interchangeable, it is equally true that the value of heat as a means of—the only means of—mechanical power depends upon the difference between initial and final temperatures. Power is had through the change from a higher to a lower temperature, and in no other way. The first of the statements is in accordance with the first law of thermodynamics and the second in accordance with the second law.

In the steam engine the initial temperature is that of the steam in the boiler, which if the pressure (absolute) is 15 atmospheres—and it is rarely so high as this—is less than 400 degrees, and the final temperature is the temperature in the condenser, which is more than 100 degrees. The difference

between the extremes of temperature is not great.

In the gas engine the range between the initial and final temperatures is several times as great, and in this lies the possibility of greater economy. There are various reasons why this increased range of temperature can not be utilized for power purposes, and while the objections may not appear to be unsurmountable, a way may possibly be found around or over them.—*Tradsman.*

## A Quarry That Produces Natural Dimension Building Stone.

There is a large quarry about fifty miles from St. John's, New Foundland, where granite has been hewn, by some convulsion of nature, into rectangular blocks of different sizes, so conveniently assorted that schooner loads of selected stones have been brought to St. John's and used in some of the public buildings and warehouses with little or no dressing by masons. The new postoffice and custom house built after the great fire which practically wiped out all the business part of the town, are partly constructed of these granite stones hewn by nature.—*Stone.*

## The Philippine Islands.

As described by U. S. Consul of O. F. Williams, of Manila, cover 150,000 square miles and have a population of 8,000,000 to 10,000,000 souls.

The beautiful sea-girt island of Luzon, on which Manila is situated, is larger than the states of New York and Massachusetts and has 5,000,000 population; the island of Mindanao is nearly, if not quite, as large. In all, there are about 2,000 islands in a land and sea area of 1,200 miles in latitude and 2,400 miles in longitude. Of the hemp exports of 1897, 914,055 tons, 41 per cent, went to the United States; more than 55 per cent, of the 1,582,904 tons of sugar, exported in the same year, came to this country. The average annual value of hemp and sugar exports to the United States, for the last ten years, was \$8,926,372. There is but one railway in the islands, the 123 miles from Manila to Dugupin. This is a well built, single track line, with steel rails, stone or iron bridges and English locomotives making forty-five miles per hour. The government assisted in the building of this railway by granting valuable land concessions and guaranteeing 8 per cent, on the stock for 90 years. The road pays more than 10 per cent, per annum. There are about 25,000 Europeans in the islands, of which 12,000 are at Manila. Trade is in the hands of English, Spanish and German houses.

## The Belgian Glass Industry.

A once flourishing branch of the Belgian glass trade, the bottle industry, has almost entirely lost its importance. Thirty years ago 32 bottle furnaces were counted; now there are but four in existence, and of these, that at Claumonceau, is idle. Those in operation are: Genaux, Hermant and Company, Jumet, production per year, 1,906,800 bottles, value, \$5,600; Eugene Hans & Company, Jumet, 1,200,000 bottles, value, \$22,100; Louis Falleur & Company, Jumet, 1,800,000 bottles, value, \$34,200. The consumption of bottles is growing owing to the increasing consumption of beer in Belgium, supplied mainly by Germany, which sends enormous quantities of bottles, mostly full ones, to Belgium.

As regards the manufacture of plate and mirror glass there are at present eight factories in Belgium. They are: Sainte Marie d'Oignies, Floreffe, Roux, Corcelles, Moustier, Auvelais, Auvelais Saint Roch, and Charleroi. The total sales of these factories in 1897 amounted to 1,123,372 square metres (1 metre equals about 10 square feet), the highest figure ever reached. The sales were divided among different countries as follows:

Countries.	Square Metres.
Belgium.....	93,372
Holland.....	76,789
Great Britain.....	576,408
United States.....	104,730
Canada.....	28,423
Germany.....	14,112
Norway, Sweden, Denmark.....	21,666
Switzerland.....	13,714
Austria-Hungary.....	30,710
Spain, Portugal.....	22,496
Russia.....	12,666
South and Central America.....	26,682
Australia.....	21,458
Orient.....	20,988
Far East.....	30,522
Various other countries.....	29,716



### New Inventions.

Among the important patents recently issued to citizens of this country were the following:

Book cover, which is in combination with a writing-book and copy-holding device.

Wire-fence spacer, composing in main part parallel wooden bars, metallic wire engaging prongs and pivoted lever.

Bicycle attachment, in which is a safety appliance consisting of small auxilliary wheels for keeping the machine in an upright position.

Portable thatch roofing, consisting of whisks of straw or like material fastened together by warp wires or cords.

Feed-water regulator for a boiler, in combination with a barrel or float and steam-pipe connections.

Railway signal, comprising in part a portable horizontal arm, having one end in form of hook engaging with the inner flange of a track rail.

Cake-turner, consisting of a turning-plate with a U-shaped rib and compressible handle provided with pivots.

Ironing-table with folding standards arranged to be locked by hooks when in upright position.

Protector for tool handles, which is made of one piece of metal and adjusted to prevent breakage or injury when the tool is in use for hammering or for drawing nails.

Machine for forming polygonal tubes, a power machine, which forms the tubes from plates or sheets.

Telescopic case or traveling-bag, to be made on the extensible pattern, and having rigid side walls.

Fountain pen, in which are some desirable features—in feed-box, duct, reservoir, etc.

Wall-book, comprising principally a leaf-carrying strip of sheet metal folded upon a line extending through the longitudinal center of the strip.

Pattern-exhibitor, consisting in great part of a display, collapsible box lined with mirrors and having reels and idle rolls journaled to a frame, and a belt carrying display figures.

Oil-burning locomotive, provided with fire-box, a lining of refractory material, a hydrocarbon-fuel burner, and other features of value.

Plow, containing a mold board having an adjustable plow point and a triangular clamping plate.

Ball-bearing device, in which are some good ideas in this line of inventions.

Nut-lock, consisting of a single piece of metal bent to form a washer to receive a bolt, and the remainder of the metal after the formation of the washer, bent to form a spring-locking arm.

Non-refillable bottle. In this the top of the bottle is closed, while the neck extends over and downwards having the opening at the bottom. There are other features to this bottle, which are worth attention.

Postmarking and stamp-cancelling machine. This has in its possibilities for rapid and accurate work, and should be of value to the Government.

Envelope-opener, comprising an apparatus with a sliding-cutter blade, which engages the edge of the envelope and instantly renders the inclosed contents accessible. This should be valuable to large business houses having much correspondence.

Sewing-machine threading device, consisting of a straight bar having a groove in one side, terminating in a seat, and funnel-shaped guide leading through the bar, the guide having a lateral slit communicating with an open-ended slot in the bar.

Pneumatic tire and method of repairing same. In this there is an opening of from two to four inches in each direction from the valve-opening, for inserting a device of thin rubber tubing with valve attached; and on either side of the slit are eyelet-holes for lacing. The thin tube is secured by cement.

Wrapper covering for bolts of cloth. This is composed of a central portion, edge portion with draw strings therein, and a series of edges for the draw-strings secured to the main portion. By this means the cloth is securely covered and protected from injury.

Hoof-pad for horses. In this pad is an apertured plate with a ventilating backing, and a frog or heel-piece on one end of the plate.

Weather-strip. For keeping out wind and water this should be effective. It is in two interlocking or hinged parts, and is an improvement upon the single-strip idea.

Umbrella holder. The user of this is supposed to carry the umbrella with the body rather than with the hands; as for this purpose braces or stays are employed, connecting the rain-shed with the body of its carrier.

Device for preventing cows from kicking. A convenient arrangement, in which a rod is secured with straps to the leg—above and below—of the animal, and acts as a lever, the upper end of which bracing its strap against the cows leg, prevents the forward movement of her foot.

Magazine fire-arm. This is a pistol with magazine mounted to turn, and having ring-shaped rim formed with bores adapted for cartridges.

Dough-cutter. A simple arrangement, in which is employed a circular cutter attached to a bifurcated upright plunger connected at its upper portion with a spiral spring. The apparatus is made on the plan hand spring stamp-machine.

Cushioned-heel for boots or shoes. In this the heel has a pocket, which contains a rubber spring having curved inner and outer walls; and there is a slip-sole having metal reinforcements formed to bear on the cushion.

Motor-vehicle. Running-gear forms the principal claim in this. The power of course is the independent motor, which is becoming more popular as time advances. There is room for a good machine of this kind.

Fruit-picker. This comprises principally a pole containing a bag for catching the picked fruit, and a clipping apparatus hinged to the pole and operated by a wire extending from the clipper downwards to the operator.

### The Sutro Baths.

The seacoast from San Francisco is reached by either one or two steam railways or the Sutro Electric Railway, all starting from the suburbs of the city and converging near the celebrated Cliff House, in front of the Seal Rocks, says Engineering News. The old Cliff House was burned on December 24, 1895, but a larger structure was at once built, and is a great resort for tourists and people from the city. North of the Cliff house are the new and extensive Sutro Baths. On the top of the hill and overlooking the ocean is Sutro Heights, the residence of Adolph Sutro, mayor of San Francisco, but who is most widely known from his connection with the famous Sutro tunnel on the Comstock lode in Nevada. The grounds of his establishment are open to the public.

On the shore, and close to the Cliff House, are the new Sutro Baths, established and built by Mr. Sutro, which were opened in March, 1896. The buildings are handsome and spacious, and form a pleasure resort for visitors as well as bathers, there being a museum and other attractions, and cheerful promenades lined with palms and growing plants. The entire building is 499.5 by 254.1 feet, and contains about 600 tons of iron-work in the columns and roof trusses, 270 cubic feet of concrete, 3,500,000 feet of lumber and 100,000 square feet of glass. Provision is made for spectators at aquatic sports and swimming matches, there being seating capacity for 3,500 persons in the amphitheater and 3,500 on the promenade, while the total capacity of the building, including the aisles, etc., is 25,000 persons. There are seven swimming tanks, as follows: One large tank, 1,409,062 gallons capacity; four small tanks, 70, 283, 400 and 875 gallons; one medium size tank, 112,500 gallons, and one fresh water tank for plunges. There are nine springboards, and seven toboggan slides lined with sheet brass and having a continuous stream of water running down them. There are 517 private dressing rooms and 9 club rooms, the total capacity being 1,110 persons; 29 dressing rooms and all the club rooms are fitted with shower baths, and there are 66 shower-baths in all. The laundry equipment can handle 20,000 bathing suits and 40,000 towels per day. The restaurant is on three floors, with an area of 30 by 75 feet on each floor. The water for

the baths is taken from the waves or rollers which break on the reef on which the baths are built.

A catchwater basin, 75 by 150 feet, was blasted out of the rock, and this receives the water from the waves, which then flows to the receiving pond, and through a tunnel to the settling tanks, whence it goes to the various bathing tanks. With a high sea rolling in, the tanks can all be filled in an hour. A centrifugal pump with a capacity of 6,000 gallons per minute keeps up a constant circulation, and can fill the baths in from five to six hours. The tanks can all be emptied in an hour, at high or low water, through an outlet of 24 inch diameter, the waste water being led away to a point where it is discharged into a tidal current, so that there is no chance of its being at once taken in again. The water is heated by a system devised by Mr. Sutro, using direct steam driven through small tunnels. The temperature is graduated in the different tanks, and in the smaller tanks it can be raised 10 or 20 degrees in a few minutes. The bath buildings are protected on the west by a breakwater lying north and south, 400 feet long, 20 feet deep, 25 feet wide at the top and 75 feet at the base, containing 450,000 cubic feet of rock; another breakwater runs east and west, this latter being 300 feet long and of the same cross section, containing 300,000 cubic feet of rock.—*Scientific American*.

### Atmospheric Electricity.

Dr. William M. Gross of Gillespie, Ill., with his startling theory as to electricity, which was referred to at some length in an editorial in our issue of February 16, has again cropped up. He proposes to build a tower 100 feet in height at Gillespie through which a wire about one-half inch in diameter will run. At the upper extremity of this wire a bunch of smaller wires will be attached by means of which he proposes to collect the electricity in the air. At the base of the tower will be located a machine, which the inventor calls an induction generator, to divert the current and prevent it from passing into earth. The details of this generator have been kept secret, the visible feature however being a revolving disk two feet in diameter, which according to the inventor, must travel in the reverse direction proportionally faster than the earth. It is Dr. Gross' opinion that enough electricity can be secured by one induction generator from the atmosphere to run a whole street-car system. As stated in our previous editorial, Dr. Gross is working upon the theory that electricity is dynamic and not static. The *St. Louis Post Dispatch*, which by the way seems to be the Doctor's mouthpiece, quotes him as follows:

"Static electricity belongs to bodies at rest. Its nature is to rise to the highest point upon the body. Dynamic electricity belongs to bodies in motion.

"The polar diameter being less than the equatorial diameter of the earth, its excess of electricity would blow off at the equator instead of at the poles, and we would no longer have the Northern and Southern lights.

"What probably occurs is, that as these currents pass around the earth through the atmosphere, they come in contact with dry areas, and as a dry atmosphere is a poor conductor of electricity it appears as a static charge and has been misleading to electricians.

"The earth and its atmosphere is the armature, and that portion of space between the earth and the sun is the electro-magnet of nature's grand dynamo-electric machine.

"The sun is shining on one-half the earth all the time. Its rays being vertical over some point of it at every instant, currents of electricity are induced out of that portion of space between the earth and the sun by the earth in its revolution from west to east. In accordance with the natural law governing electric currents, they go in an opposite direction, or from east to west.

"Lentz in 1833 demonstrated by a series of experiments that induced currents always go in the opposite direction to the electro-magnetic force producing them.

"These currents are brought down to and forced into the earth by its centrifugal force, which tends from its center toward the east, while the currents tend to its center and toward the west. When the center of the earth becomes surcharged with electricity, it flows off again at about the 70th parallel, producing Northern and Southern lights.

"My machine is designed after the earth as a pattern. When placed at any point upon the surface and driven as required, it will be the earth's superior in centrifugal force and magnetism."—*Electricity*.

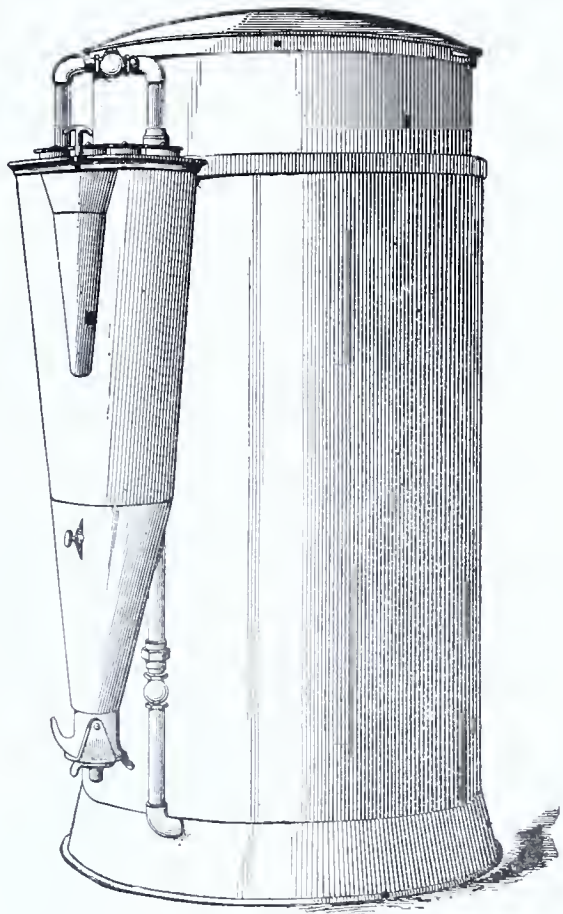
The Atlantic Transport Line, which has its headquarters in Baltimore, has sold the government seven of its fleet in service between New York and Great Britain.



### The Success of Acetylene Gas.

We Give herewith a cut of the Calcium Light Generator (McCleary system), which has made its appearance into the world of illuminants as something new and of practical value. It comes with a claim to have fulfilled the conditions of a perfected acetylene gas machine, and from the tests to which it has been subjected most satisfactory results have been obtained. For a long time acetylene gas has been something to be feared by most people, on account of its supposed poisonous qualities and its liability to work destruction by exploding. The latter disagreeable characteristic of this gas unfortunately has been demonstrated on various occasions; but like many other things acetylene needed only the right kind of apparatus to make it perfectly harmless in the latter particular and, if there was a poisonous element contained, it and the element of danger from explosion have been done away with by Mr. McCleary's invention.

These are two of the claims in its favor. Convenience simplicity of arrangement, cost and lighting qualities, are others. It can be placed inside any house, office, church, etc., without interfering with insurance rules: it is so simple that a child can attend to it; the cost is less than that of city gas, electricity or even coal oil. A comparative statement in the latter item shows that one pound carbide, which costs five cents makes five feet of acetylene gas that with a one-foot burner will last five hours. The best oil lamp will burn fifteen cents worth of coal oil in eighth and one half hours. A one-foot acetylene burner of the same candle power as the lamp is manifestly much cheaper, and gives



a superior quality of light. As compared with city gas the following comparison makes a fine showing for acetylene:—Calcium carbide cost five cents per pound in small quantities. Ten pounds will produce about fifty cubic feet of acetylene gas, which will supply one one-half ft. burner one hundred hours at a cost of fifty cents. City gas burnt in a six-foot burner would be consumed at the rate of 600 feet in one hundred hours, and would cost seventy-five cents, assuming that city gas cost \$1.25 per 1,000 feet. Therefore you obtain a more beautiful and brilliant light at a comparatively less cost than by use of ordinary gas.

The Calcium-light Gas Generator (the outer construction of which can be seen by the accompanying cut) is so constructed that 2½ pounds of carbides is dropped, by means of an automatic and very simple device, into a large body of water. This makes 12½ cubic feet of acetylene gas, which bubbles up through the water cleaned out and purified and enters a holder made to contain that number of feet. When this amount is used, the holder gradually falls, and a pin on the outside engages a spring attached to a chamber holding another charge of 2½ pounds which drops into the water, making another 2½ feet of gas; and so on around until all the chambers are emptied, after which a child, if necessary, can recharge them in a few moments. The residuum is drawn from the bottom of the generator

by a very easy and simple arrangement, thus overcoming one of the most difficult and annoying features in any acetylene gas generator.

While the McCleary Calcium-light Generator is so well adapted for all lighting purposes in a city, its use is of especial advantage in small towns, suburban and country places where gas cannot be conveniently obtained.

### Coal in the Philippines.

Consul-General E. S. Pratt at Singapore has gathered a number of interesting facts regarding coal in the Philippines. On the small Island of Batan, to the southeast of Luzon, just through the Straits of San Bernadino, there are extensive coal deposits, now worked by Messrs. Gil Hermanos, of Virao, Island of Catanduanes. This coal is used by their own steamer, Josefa Gorona, plying round the coast of Catanduanes and occasionally coming to Manila with hemp, and also by other local steamers. The mine is called Visaya, and stocks of coal are generally on the beach. There is a safe anchorage for vessels close by during the northeast monsoon. In the southwest monsoon vessels can anchor anywhere around in smooth water. The coal is not equal to Japanese, but is good enough for an emergency, and easily obtainable. The mines are situated in latitude 13° 15' north, longitude 130° 16' east (Meridian of San Fernando), approximately.

Other extensive coal mines are also being worked in the village of Compostela, close to the city of Cebu. This coal is of superior quality, and stocks are always available.

A railway to the sea is in course of construction and probably finished by this time. Several U. S. government and English steamers have coaled there already.—*Manufacturers' Record*.

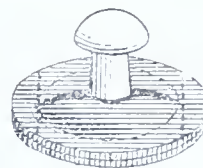
### War and Business.

It is hard to tell why the present war should have such a depression effect on business, but that it has that effect is only too plain. In all lines there has been a hesitation about investing, new projects have been held back, and everybody has apparently been waiting for something to occur. It may be that our recent naval victory, and the total destruction of the Spanish fleet, will give the timid further assurance as to the outcome of the presene struggle. There never was room for a reasonable doubt as to the result of the war, if kept within its present lines, and as the end approaches the danger of complications grows less. Some who ought to make a pretty good guess, predict that the effect of our latest victory will be seen within a short time in generally improved business conditions.

In many quarters there is an impression that the close of the war will bring a boom in the trade. Our national experience so far has shown that the war at the outset made bad times, the termination was soon followed by a great improvement. The country after the Revolutionary war enjoyed a wonderful degree of prosperity for over twenty years. The war of 1812 had a like good effect upon its conclusion, and the country was prosperous up to the panic of 1819. The close of the Mexican war brought prosperity which lasted until 1857, and the good times that followed that war are remembered by the present generation. It may be that the present war will have something of the same effect.—*American Manufacturer*.

The Arctic expedition under Walter Wellman sailed from Tromsø, Norway, June 26th. It is undertaken with two objects in view, the first to find and succor Prof. Andree and the second to discover the north pole.

### Collar Button Shield



People who wear collar buttons and this includes a large percentage of both sexes in these days of shirt waists) have been greatly troubled by the discomfort caused by the pressure of the base of the button against the neck, resulting in irritation, and often in serious sores. This is especially true of the cheaper metallic buttons which soon tarnish and cause a spot on the neck, or what is worse, act as a poison and produce troublesome sores.

A unique and extremely meritorious device to remedy this evil has recently been patented, and is shown in the accompanying cut. It consists of a flexible shield or cover for the base of the button, formed of two superimposed disks of thin soft leather or chamois, with a slit in one of them through which the base of the button is entered and seated between the disks. The button is thereby kept entirely from contact with the neck, and a broad soft bearing is provided, greatly to the comfort and relief of the wearer.

Ladies who wear collar buttons in their shirt waists will appreciate this invention equally with the men. It can be readily slipped upon any button whether it be the common bone or celluloid article, or the metallic lever type. Best of all, it can be made and sold so cheaply that it can be worn by everyone. The cost to the purchaser need not exceed five cents, and even at this low price there is a good profit for the dealer or agent.

The patentee has the device ready for the market, and full particulars may be obtained by dealers, agents and others by addressing The Dunning Shield Co., 705 G Street N. W. Washington, D. C.

### Zoological Parks.

The establishment of the National Zoological Park, Washington, has led to the formation of many other zoological preserves in the United States. In the western part of New Hampshire is an area of 26,000 acres, established by the late Austin Corbin, and containing 74 bison, 200 moose, 1,500 elk, 1,700 deer of different species, and 150 wild boar, all of which are rapidly multiplying. In the Adirondacks, a preserve of 9,000 acres had been stocked with elk, Virginia deer, muledeer, rabbits and pheasants. The same animals are preserved by W. C. Whitney on an estate of 1,000 acres in the Berkshire Hills, near Lenox, Mass., where also he keeps bison and aetelope. Other preserves are Neshane Park, in the Adirondacks, 8,000 acres; Tranquility Park, near Allamuchy, N. J., 4,000 acres; the Alling preserve, near Tacoma, Washington, 5,000 acres; North Lodge, near St. Paul, Minn., 400 acres; and Furlough Lodge, in the Catskills, N. Y., 600 acres.—*Scientific American*.

To supply the Army and Navy of the United States, now expanded to a war footing, very large demands are being made on the American Bible Society for pocket Testaments. Tens of thousands of copies have been called for by the chaplains of regiments, Young Men's Christian Association officers and other responsible parties who are at work in the camps all over the country and at the front.

An instance of the value of the search light in war was shown during the recent occupation of the shores of Gnantanamo Bay by the American marines. The camp of this force was greatly annoyed at night by persistent firing from the dense thickets surrounding it, and as the nights were very dark no effective reply could be made. The search-light of two or three vessels lying in the bay were turned upon the woods in which the Spanish sharpshooters were concealed, with the result that they were located and driven out with comparative ease.

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### Commercial Position of Spain.

The actual condition of Spanish trade can be understood only when it is remembered that the commercial treaties and the normal state of trade came to an end in 1892, whence arose great fluctuations in imports and exports. Conventions were made with certain countries, and now there are four groups of nations having different commercial relations with Spain, and subject to different tariffs for their exports to that country. Spanish exports consist for the most part of agricultural and mineral products; but during recent years, owing to the colonial wars, coined money has been imported in large quantities. Manufactured goods are relatively of small importance. Thus, in 1896, the chief exports in order of importance were: Wine (15 per cent of the whole export trade), silver money (14.3), minerals (10.6), metals, (9.6), fruit (8.8) and cotton cloth (5.4). The chief imports, and those which form the basis of the national income from customs duties, are codfish, cocoa, petroleum, wheat and other grains, spirits, sugar, coffee, and flour. These produce about 45 per cent of the total duties on imports. Sugar, spirits, coffee, and wheat flour are no longer of great importance; while wheat and other grain, which form by far the most important item, can not be considered a sure source of income, as the amount depends on the home crop and before the war the demand for flour in Cuba. Petroleum, the next most important item, has every year more difficulty to contend with gas and electricity, and its general use is decreasing. Codfish is the most satisfactory source of customs revenue in Spain, and remains one of the staple articles of food there. Of the total trade of Spain, excluding the precious metals, France has 25.4 per cent, the United Kingdom 23.9, the United States 5.4, and all other countries under 5 per cent. Great Britain and France absorb more than half the exports, send nearly half the imports, and have very nearly half the total foreign trade; but under French trade with Spain is included much that is in transit to other countries. Of the Spanish colonies, Cuba had 10, Puerto Rico 4, and the Philippines 3.9 per cent of the trade. The comparatively large imports from the United States (4.8 per cent) are composed of lumber and raw cotton. The total imports of Spain in 1896 amounted to over £33,500,000, and the exports to over £38,750,000—a total of £77,280,000—of which Catalonia absorbed 35, Andalusia 20.9, Vascongadas 12.8, and Valencia 12 per cent, respectively. Hr. Harrison, referring to the scarcity of grain in Spain during the past winter, traces the customs legislation in that country in regard to wheat and wheat flour during the present century. It has undergone many changes. In 1890 the duties imposed were 8 pesetas (or francs) per 100 kilograms of wheat and 13.26 pesetas of flour, while in 1895 an unusual surcharge was imposed, making the duties 10½ pesetas on wheat and 17.30 pesetas on flour. Since 1869 imported wheat has been one of the chief sources of customs revenue, and in 1895 and 1896 yielded 17 per cent of the whole. The crop of 1897 was much larger than that of the previous year, and larger than the average. As to the textile industries, the increased customs duties of 1892 have protected all home manufactures, chief among them being those of textiles. The markets thus created at home and in the colonies were only impeded by the heavy duties on raw materials, which cause Spanish textiles to be hardly cheaper than those imported. "Although there has been an appreciable gain in the receipts of the custom house, general trade has declined; and there is a large decrease in the quantity of the goods consumed, as is evident from the fact that a decreased importation of raw materials does not prevent an increased exportation of manufactured goods. The present condition of the textile industry in Spain is purely artificial. In cotton goods an average annual export amounts to 8,675 tons, and of this only 271 tons are exported to foreign countries, making 96.87 per cent consumed in Spanish colonies." Of Spanish woollens 76.4 per cent and of silks 88 per cent went to the colonies. The wine trade appears to be improving, Spain coming next to France and Italy in amount of production; while Mr. Harrison thinks that with more skill in their manufacture Spanish wines should have no difficulty in commanding their own market. In 1896 Spanish mines produced over £4,250,000 worth of minerals, valued at the mouth of the mine. Of this lead came to over £1,500,000, iron to over £1,000,000, copper to less than £500,000, coal to over £500,000, and

quick-silver and salt to about £250,000 each. Shipping is a very important Spanish industry, and the tonnages of the Spanish mercantile marine is only exceeded by that of Great Britain, France, Germany, and Norway. In Spanish ports, British shipping holds the first place, the tonnage being four times greater than that of the national shipping, which comes second.

### Rock Railway in the Tropics.

There is a rock railway in Sumatra built for industrial purposes, a purpose to which this kind of road is not generally put. The line crosses the Barison mountain range. The track is made of two soft steel channels joined by riveted pins, and is bolted to cast-iron chairs fastened to steel sleepers, which carry the ordinary rails. Steam locomotives are used; and the line is nineteen miles long, climbing in some places very heavy grades.

Dr. James Hall, the eminent geologist and scientist of New York died August 8, aged 87 years.

### Electricity in Japan.

Electricity seems to be very much in favor in Japan. According to one of the learned men of that progressive country (Professor I. Frejioka), there are 1,200 miles of land telegraphic lines and 338 miles of submarine cables controlled by the Japanese Government, and besides this there is a cable extending to Formosa, a distance of 800 miles. In 1890 the first telephone exchange in Japan was established, and in 1896 there were 540 miles of these lines, and 3,232 subscribers. Many of the large cities and towns are lighted by electricity, and in Tokio alone there are over 50,000 lights. The electric street railway is not much in evidence with the Japs. Tokio has but two electric car lines, although its population is 1,500,000.

Wireless telegraphy is claiming much attention in England, where some interesting experiments are being conducted with Marconi's system.

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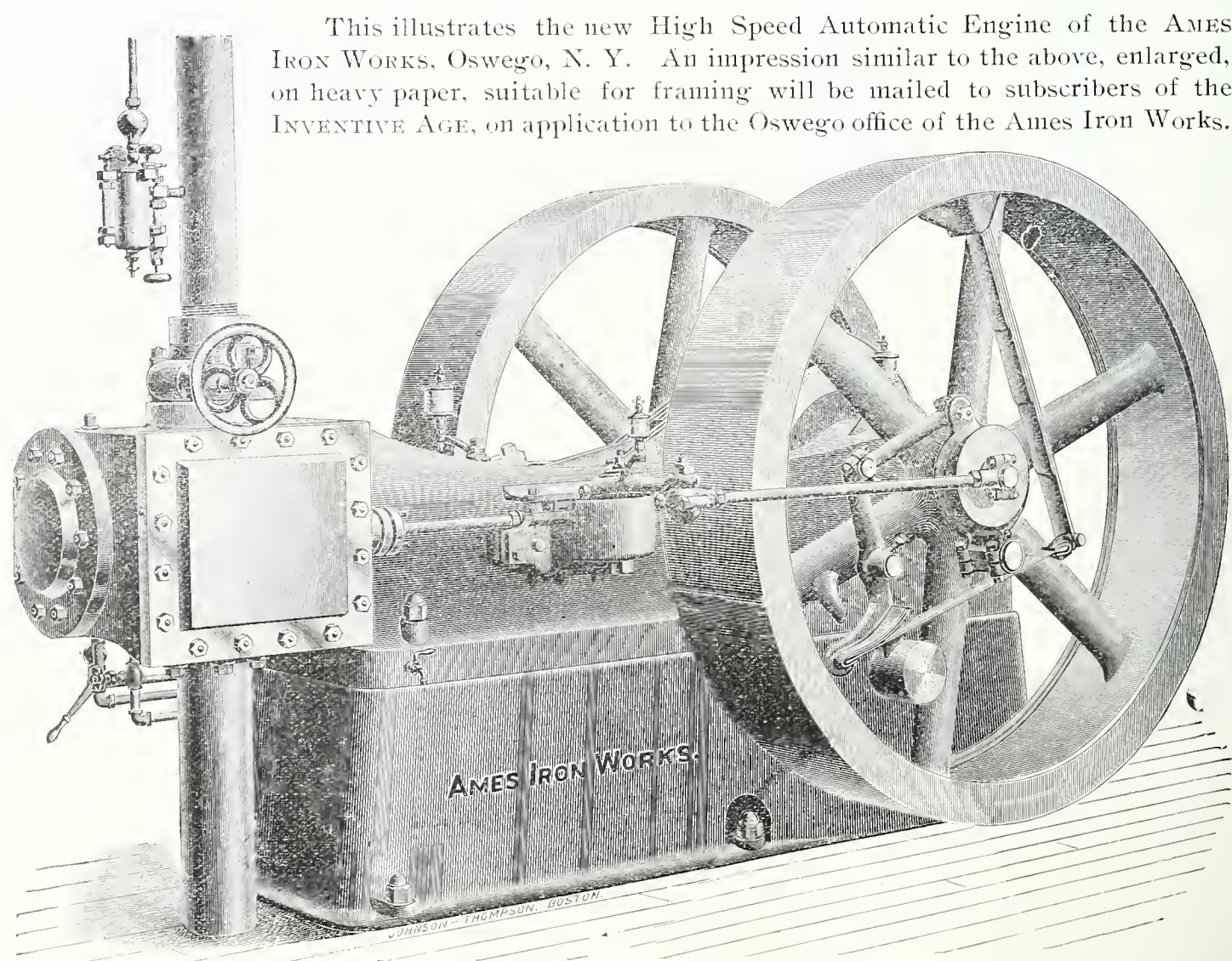
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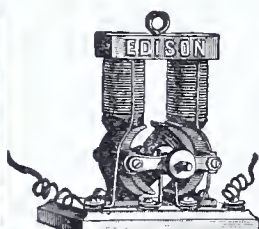
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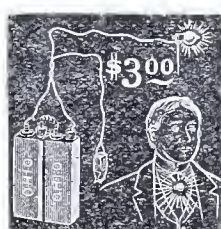
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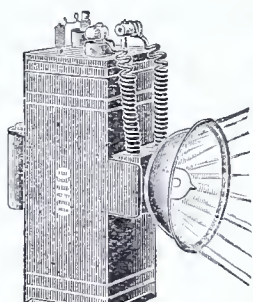
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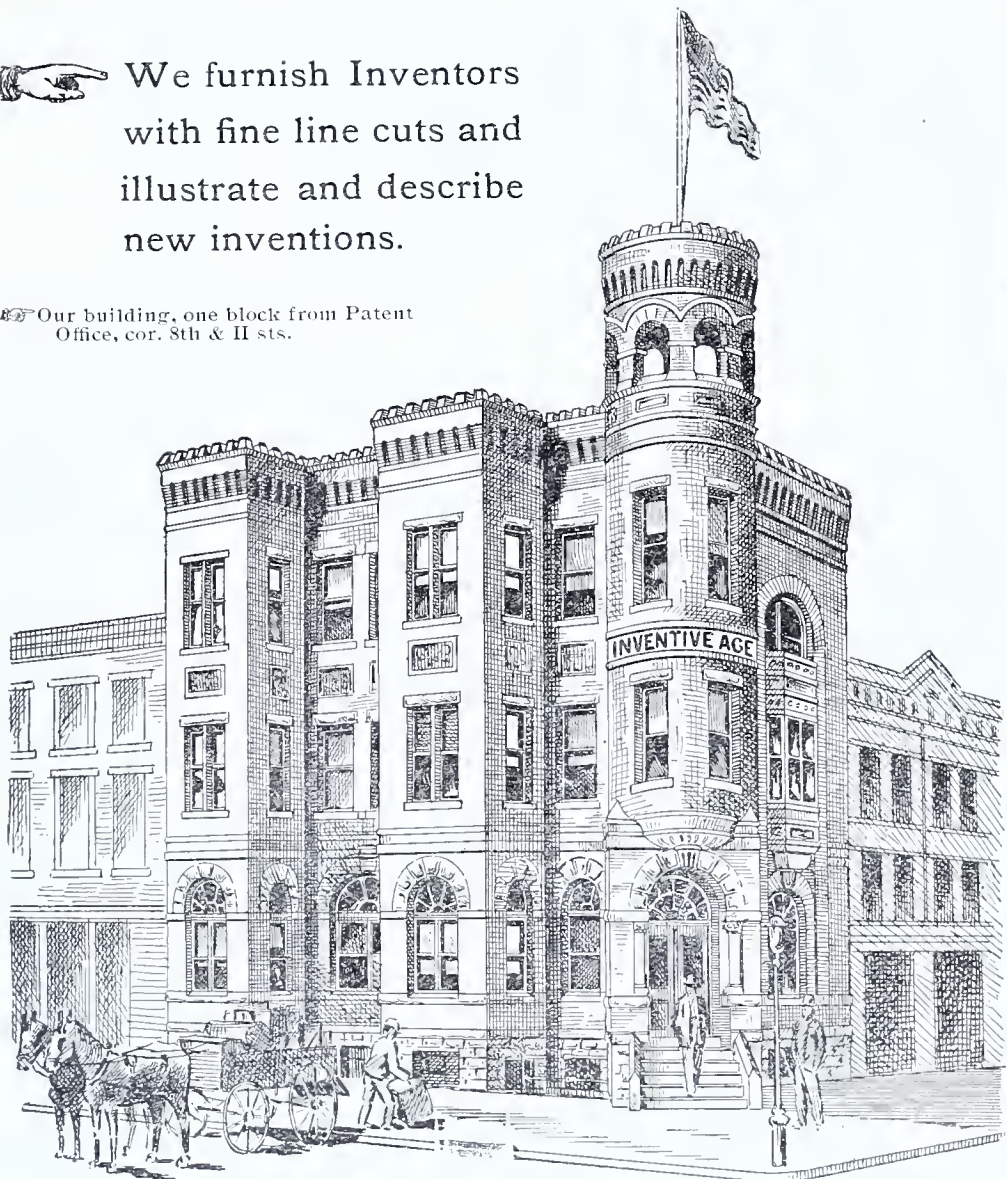
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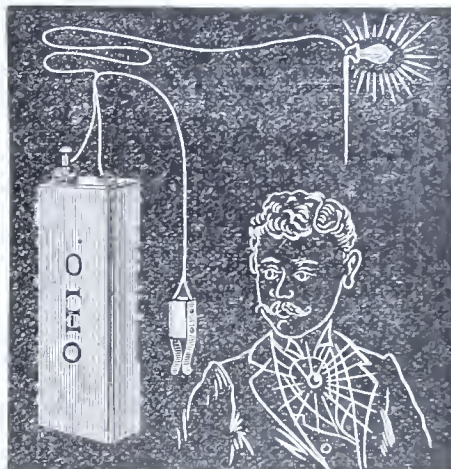
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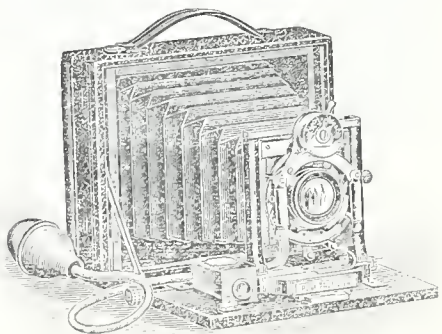
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## ART IN THE NATIONAL MUSEUM.

The National Museum, which has in it so much that pertains to art, science, ethnology, etc., has among its interesting collections concerning American Indians and their industries, a life-like group in plaster of Navajos engaged in the manufacture of silver ornaments; and near by is displayed a great variety of the latter product of these clever savage workmen.

While a number of Indian tribes are superior to the Navajo in the matter of making pottery—things that concern so closely the Indian's necessities—this savage finds an outlet for his artistic taste in this particular that elevates him among his kind. Utility for bodily welfare is not pre-eminently his forte, but the love for self adornment has made of him a very commendable red artizan.

This is manifest in the collection which the able efforts of the Museum's ethnological scientists have gathered from the land of the Navajo. Here we see work that might well have come from the hands of white silversmiths. Among this are bracelets, finger rings, beads, powder-flasks, belt-clasps and other belt ornaments. There are several different kinds of the latter, the most of them being circular, with oval tops. One set consists of seven oblong, rounded disks about four inches long by two inches wide, having pointed filagree work around the rims. The oval tops have diamond-shaped raised centers from which radiate points in relief. The metal of which these disks are made are very white, and the effect altogether is charming.

Among the belt-clasps and buckles are two specimens which a society belle would by no means disdain to wear. The prettiest of these is composed of two pyramidal parts with radial corrugations and circular rims; they are each two inches in diameter, and are joined by hook and catch. The other is a strap buckle two inches square ornamented with short, straight corrugations at the sides, and a beautifully executed leaf in the center. Modern day productions can do no more than equal them.

The little silver powder flasks shown in the exhibit were hardly intended for use in battle or chase. They are about three inches in diameter, are made in imitation of a soldier's canteen, and would not hold much more than a dozen loads of powder—nor whiskey enough to furnish the noble savage the tenth of a jag. Some of the bracelets shown are beautifully chased, as is a large silver ornamental comb, which no doubt found lodgment in the jetty hair of some Navajo belle. This comb has a broad open-work top and four long teeth, and is an exact reproduction of the back-hair comb long used by civilized ladies.

All the silver work in the Navajo collection is finely polished, and its construction is so far beyond the usual idea concerning Indian workmanship that one naturally wonders how they did it. And when this is found out, the Navajo's ability to adapt "small means to great ends," increases our admiration for the untutored red smith.

The builder of object lessons in the Museum sets forth in a skillful manner by his group of silver-smiths at work, their simple process for converting raw material into things of beauty. In this exhibit there are four figures, one at the bellows of the forge; one with hammer and punch, making a matrix for buttons; another using a blow-pipe upon a lump of silver; while the fourth, a female, looks on, but does not take part in the work.

Beside the forge and bellows, the tools of the Indian silver worker consists of cold-chisels, punches, awls, pliers, scissors, files, tongs, molds, matrix and dies, crucibles, anvil, blow-pipe, and other adjuncts to the business, such as wood, wire, emery paper, polishing stone, etc.

The Navajo does most of his work in silver while sitting on the ground or in a squatting position—the Indian is a natural squatter—though working the bellows is an exception in this matter. This part of the outfit is made of two separate, collapsible cylinders about ten inches in diameter at the

from the thin sheet of silver and forced into an iron matrix by means of dies. After the diminutive globe has taken the shape of the matrix cavity, its yet open end is soldered and then filed round and smooth. Now comes the polishing and whitening process. Emery paper and powdered stone play an important part in the first of these operations; and in the second, common salt and a hydrous sulphate of alumina, are used. The latter is dissolved in water, after which the salt is added, making a solution now ready for the white metal, which must be boiled in the prepared liquid, after first being slightly heated. This treatment gives to the metal a remarkably white appearance, and when the polishing is completed, the object is as brilliant as could be desired.

When the Navajo Indian appears in all his gaudiness—decked out in fringed pantaloons, colored blanket, shining beads, rings, belt ornaments and other glittering evidences of his love for display—he is an object of envy, to his less fortunate brethren, and a picturesque savage.

This aboriginal silversmith, unlike some Indians, does not keep strictly in the time-worn industrial ruts of his forefathers. He has adapted to his work some of the implements of the white worker, though none of improved pattern, and the time may come when the red silversmith will handle his art with much perfection.

When and where the idea of silver working first dawned upon his race, is an inexplicable mystery; probably the silversmith's art was taught his remote ancestors by the ancient Mexicans; those strange people, from whom has come down through the ages to us, so much object history in prehistoric art.

The Pueblo Indians, as well as the Navajos, have their silver workers, whose craft no doubt came to them originally from more southern tribes. And it is strange that many, or all, Indian tribes should not have expert makers of jewelry and curios, because the aboriginals delight in these things, which shows

that their faces are at least turned toward the temple of beauty, though they are a "long way from base." Among the many thousands of interesting, and often, beautiful exhibits in the National Museum and Smithsonian Institution, that of the Navajo silversmiths is of peculiar interest; for it shows the ingenuity of the untutored savage; his appreciation of the artistic, and his ability to accomplish with crude implements that which is impossible to the average specimen of his more enlightened white brother, even when the latter has at his command tools adapted to his purpose. On page 123 of this number will be seen a picture of the cast from which was made the statue of the Goddess of Liberty which is on the top of the U. S. Capitol. This statue stands in the center of a gold-fish pond in the National Museum which adjoins the Smithsonian. It bears the following inscription: Made in Rome, Italy, by Thomas Crawford an American sculptor, born 1814, died 1857. Bronze cast by Clark Mills, Washington 1860. Height of statue 19 feet 6 inches.



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outer ends, but tapering toward the forge, where they join into a common air channel. These bellows are made of goat skin and are arranged horizontally opposite each other, so that the wind-maker can grasp the outer end of each, with a hand, and push forward, using the weight of his body to aid muscle.

The forge is made principally of mud, laid six inches thick upon a platform supported by stakes, which are driven into the ground. A flat rock often serves for an anvil; and with this between his legs the red smith sits for hours pounding away earnestly upon Mexican dollars or other white metal which is to assume the shape of his artistic fancy. Usually the metal to be worked up is first cast into small ingots, after having been melted in crucibles formed of baked clay; the molds are cut in sandstone.

In making silver beads the Navajo does not resort to the melting pot and the ingot, but beats out large coin until the required thickness of the metal is obtained. Then little circular portions are cut



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THE discovery of creosote dates from 1830, when it was first extracted from wood tar by Reichenbach.

THE consumption of flour in the United States amounts to about 14,000,000,000 pounds annually. This amount of flour made into bread would furnish 20,000,000,000 loaves.

It is stated that about \$900,000,000 are spent annually by the people of this country for meat. Of the latter 5,000,000,000 pounds of beef, 4,000,000,000 of pork, and 800,000,000 of mutton are consumed.

THERE are three small railroads in our new island possessions. The longest of these roads is on the island of Oahu, and is 38 miles in length. The next longest is that on Hawaii, which traverses the island for 20 miles. The shortest (3 miles in extent) is on Kahului.

SINCE the Minnesota Iron Company, and the Illinois Steel Company joined forces, it has been proposed that a new corporation to be known as the Federal Steel Company, be formed. If this idea is carried out, it is probable that quite a number of firms will come into the concern.

THE newest chewing gum is that which contains an extract of tobacco. It is safe to say that neither women nor girls will take very kindly to this new jaw-taxer, but to the lovers of the quid that soothes it certainly offers a long and elastic chew, if not a strong one. It will serve as an educator in the use of the weed for boys; but there is nothing in this value to recommend such a doubtful utility.

## Universal Peace.

Never before has so remarkable a proposition from such high authority astonished the world as that which, from the Czar of Russia, invites the nations of the earth to lay aside the weapons of war and follow the paths of peace.

If such a blessing as this were to come to mankind the world would soon take on a new aspect; for with universal peace millions of men, who now are only paid consumers of the world's products without contributing to its prosperity, would find their places in the various vocations of life and help push along the wheel of human progress. Art, science, agriculture, mechanics, etc., would receive new impetus; trade between nations would flourish as never before; taxes would be lessened, and (especially in Europe) home would have more the protection of the man, while woman, having

less to do with field labor, would consequently be raised in the scale of humanity.

But we do not expect soon to see the sword beaten into the plowshare, nor the spear turned into the pruning hook. The millinum is not yet; and the avarice of men in high places will still cause them to marshal great armies for conquest, and to oppress the poor by taxing them to provide the sinewes of war.

The Czar of all the Russians deserves the thanks of mankind for his good intentions. His peace proposition is indeed remarkable, for it comes from the ruler of a great fighting nation, able to take good care of itself in war, and from one who is surrounded by enemies at home.

## Inventor and Attorney.

It is a remarkable fact that out of the thousands of patents issued every year such a large percentage of them never bring the inventor a solitary cent. This is often due to the lack of business method in the owner of the patent, and very often to a lack of capital wherewith to put the merits of the invention before the public through legitimate and honest channels of advertising. But not infrequently the lack of success of a good invention is due to insufficient intelligence in the patent attorney employed—one who through lack of technical knowledge in art and science (that which has to do with the work in hand) fails to show the claims to which the invention is justly entitled. A patent properly prepared may bring to its owner many thousands of dollars, but with its important features left out, it becomes "dead matter" to the inventor—and only represents wasted effort and often hard earned cash.

In speaking of this in his last report the Commissioner of Patents says in part:

"The laws governing the grant of patents are not as fully understood by the general public as they should be. The inventor who for the first time seeks a patent, particularly if he resides at a distance from the larger cities, generally believes that all he needs in order to secure protection for his invention is a document issued by the Patent Office and bearing its seal. He does not know, apparently, that however valuable his invention may be the patent issued therefore may, if not properly drawn, fail to protect him against infringers and be practically worthless and be no more in effect than a notice to all the world that the invention may be used by any one without paying royalty to the inventor."

## Revision of Patent Laws.

A recent number of the *Patent Office Gazette* contains the following, which is of interest to inventors, attorneys and others:

"The act approved June 4, 1898, provides for the appointment of three commissioners, whose duty it shall be to revise and amend the laws of the United States concerning patents, trade and other marks and trade or commercial names, which shall be in force at the time such commission shall make its final report, so far as the same relates to matters contained in or affected by the convention for the protection of industrial property concluded at Paris March 20, 1863, the agreements under said convention concluded at Madrid April 14, 1891, and the protocols adopted by conference held under such convention at Brussels, 1897, and the treaties of the United States, and the laws of other nations relating to patents, trade and other marks, and trade or commercial names,

"The commissioners appointed are: Peter S. Grosscup, United States District Judge for the northern district of Illinois; Francis Forbes, of New York, and Arthur P. Greeley, Assistant Commissioner of Patents.

"All persons interested in the revision and amendment of the laws provided for in the act above referred to are invited to send to the commission such suggestions as they may wish to make in reference thereto, before Oct. 15, 1898. Communications should be in triplicate, and may be addressed to care of Assistant Commissioner of Patents, Washington, D. C.

## Exports from the Philippines.

If those who are opposed to the annexation of the Philippine Islands to the United States will only learn the productive value of those islands, it is possible that the (unbiased) investigator will change his opinion.

From a recent Consular Report we find that of hemp alone there were exported from the Philippine Islands during the ten years ending in 1897, 6,528,965 bales (914,055 tons), of which the United States took 41 per cent.

This country during this time also took from the Philippines 875,150 tons of sugar (Europe taking 707,754 tons), 55 per cent of the 1,882,904 tons exported from the islands.

The following interesting matter is also taken from the Consular Report referred to:

There are about 25,000 Europeans resident in the islands (the total population is nearly 8,000,000), of course not counting the troops. Some 12,000 are established in the capital, Manila, the center of the colonial government. English, Spanish and German houses are engaged in trade, advancing money to the natives on their crops. Such business methods involve risks and necessitate large capital in the beginning, but the profits are immense. The land is fertile and productive, and lacks only intelligent cultivation. Abaca (manila hemp) is one of the chief sources of wealth of the country. Sugar cane does not give as satisfactory returns, owing largely to the ignorance of planters. The average production is 178,000,000 kilograms (175,176.96 tons), while that of Cuba is equal to 720,000,000 kilograms. The sugar goes almost entirely to Japan, England and the United States. It is of poor quality and very cheap. The cultivation of tobacco is one of the most important industries, although it is capable of much greater development. The native coffee, although not equal to the mocha or bourbon varieties, has a fine aroma. It goes chiefly to Spain. Cocoa trees grow in abundance, and the oil is used for lighting houses and streets. The indigo is famous for its superior qualities. The inhabitants are apathetic to a degree that is noticeable even in these countries, where everyone is averse to exertion. The women have long and slender fingers, remarkably fine and sensitive, and well adapted to their work. The hats and cigarette holders they make and the articles they embroider are models of delicacy. Cotton spinning and work in bamboo are among the chief industries.

## Water or Spirits?

There has been considerable talk concerning the nature of the liquid that will be spilled over the bow of the battle-ship Illinois. The temperance folk, of course, wish her to be christened with "Adam's ale" (water), and the "other" folks desire a baptising fluid with more "git-up-and-git" in it. But whatever liquid is used in this interesting ceremony, it is safe to say that the good ship that Miss Leiter will break the bottle over will glide into the water in perfect "ship-shape," and later add her fighting strength to Uncle Sam's navy, the best in the world.

## Yankee and Jap.

It is strange that after opening the ports of Japan, to the trade of the world, America should allow other nations to step in and reap so large a benefit in trade, especially as that obtained by Germany and England. Being first on the ground the United States could by proper methods have so strengthened its trade relations with Japan, that, instead of being behind others it would have long ere this been the chief factor in that progressive country's import business. America has a strong moral influence in Japan; and the Japanese knowing this country to be the greatest and most progressive of all countries are anxious to advance the reciprocal interests between themselves and us. As time goes on they are falling more and more into our industrial methods and customs, finding special benefit in our mechanical products.

It is absolutely necessary that America have an extensive foreign market; and when an advantage of this kind offers itself it seems that American thrift and enterprise should jump at the opportunity.

The largest mass of pure salt in the world is in Galicia, Hungary. It is 550 miles long, twenty broad, and 250 feet in thickness.



## GUNS FOR COAST DEFENCE.

## Fifty Great Pieces of Ordnance Are Nearing Completion.

In a very few months this country will possess quite an important addition to its resources for home defense. The first one of fifty improved, thoroughly up-to-date rapid-fire guns, now in course of construction at the Diamond Drill Works, Birdsborough, Pa., will be finished in a week or two and the completion of the others will quickly follow.

These guns are intended for coast defense exclusively. The contract for them was awarded only a few months ago, at a time when the end of the war with Spain seemed near at hand, and this demonstrates the fact that the Government has no intention to discontinue war preparations, even with no more war in sight. The Government's determination in this respect is also shown by the continued activity at the Carpenter Steel Works, in North Reading, where an immense number of steel projectiles and shells of various sizes, for army and navy use, have been finished and shipped to different points in the past thirty days, and the plant is still running day and night, just as it would were the war yet in progress and the shells being thrown against Spanish ships and fortifications.

Since August 1st projectiles aggregating in value \$200,000 have been made at the Carpenter plant, and the work goes on with new contracts also in sight.

The fifty coast defense guns now being made at Birdsborough are to cost the Government half a million dollars, or an average of \$10,000 each. To facilitate their rapid completion the Diamond Drill Company put up, in a very short time, a large building especially designed for gunmaking, and at a cost of many thousands of dollars, equipped the structure with the most modern machinery. Twenty-five of these rapid-fire guns are to be of 5-inch bore, and twenty-five of them 6-inch.

Both the 5 and 6-inch guns have breech actions made so that they can be opened very quickly, and all use "fixed" ammunition; that is ammunition in a metallic case, like that used in a shoulder gun.

The 5-inch gun can be operated to fire from five to ten shots a minute, the number depending upon the skill of the gun's crew. The 6-inch gun can be worked about half as rapidly. The 5-inch can be fired so much faster than the 6 for the reason that the projectile and powder are in one cartridge case for use in the smaller gun, while the 6-inch shell is so heavy that the projectile is put in first and the powder case afterward, requiring two movements. Both size guns are of extra high power, and will do great execution at a range of five miles. When finished they will be tested on the proving grounds at Birdsborough, and when in perfect condition shipped to the ordnance department. It has not been given out as yet just where these guns will be placed.

## Only The Breath Lost.

In an article on the "Wonders of the World's Waste," William George Jordon, in the Ladies Home Journal, details how science at the present day utilizes the ox. "Not many years ago," he says, "when an ox was slaughtered, forty per cent of the animal was wasted; at the present time 'nothing is lost but its dying breath.' As but one third of the weight of the animal consists of products that can be eaten, the question of utilizing the waste is a serious one. The blood is used in refining sugar and in sizing paper, or manufactured into door knobs or buttons. The hide goes to the tanner; horns and hoofs are transformed into combs and buttons; thigh bones, worth \$80 per ton, are cut into handles for clothes brushes; fore-leg bones sell for \$30 per ton for collar buttons, parasol handles and jewelry; the water in which bones are boiled is reduced to glue; the dust from sawing the bones is food for cattle and poultry; the smallest bones are made into boneblack. Each foot yields a quarter of a pint of neat's foot oil; the tail goes to the soup; while the brush of hair at the end of the tail is sold to the mattress maker. The choicer parts of the fat make the basis of butterine; the intestines are used for sausage casings or are bought by gold beaters. The undigested food in the stomach, which formerly cost the packers of Chicago \$30,000 a year to remove and destroy, is now made into paper. These are but a few of the products of abattoirs. All scraps unfit for any other use find welcome in the glue pot or they do missionary work for farmers by acting as fertilizers.

THE exports of typewriters, bicycles, sewing machines and instruments for scientific purposes from the United States during the past year by countries as reported in the official figures of the treasury bureau of statistics were: Typewriting machines, \$1,902,152; bicycles, \$6,846,529; sewing machines, \$3,136,364; scientific and electrical instruments, etc., \$2,770,803.

## The Work and Needs of Our Patent Office.

If it be true, as has been said, that the patent office is the pulse of a nation, then these United States must have been in a very healthy condition during 1897 judging from the report of that office which has just been issued. It seems with interesting figures which show that the inventiveness of this country is on the increase, but that the Patent Office is being managed on so economical a basis as to injure the great mass of inventors clamoring for protection and industries awaiting further development.

In 1879 there were received 45,661 applications for patents, which is a greater number than for any previous year in the history of the office. 23,729 patents were granted, which number was only exceeded in 1885, 1890 and 1891, the highest, 262,392 being reached in the last named year. The cash received was the greatest since the establishment of the office; the money expended, \$1,122,843, however, being exceeded in several years. The receipts over expenditures was \$252,798, and the total balance to the credit of the Patent Office in the treasury of the United States on January 1, 1898, was \$4,971,438. Regardless of this laudable state of affairs, there has been no increase in the force or facilities for doing the work. The consequence of this is, as might be expected, that the work of the office is largely in arrears. The number of applications awaiting action December 28, 1897, was 11,382. Of these, 7,858 were applications which had been taken up for examination. The first few months of 1898 have added largely to this already stupendous accumulation, and unless relief is given by Congress in providing additional force, the work will fall hopelessly in arrears.

It may be of interest to learn that the number of applications filed in 1897 exceeded by over two thousand the total number of applications filed in the twenty-four years from 1836 to 1860. In proportion to population more patents were issued in 1879 to citizens of Connecticut than to those of any other State, namely, 1 to every 786 inhabitants.

As a matter of comparison, it may be of interest to state that the number of applications in England during 1887, was 30,958, an increase of 765 over the number applied for in 1896, against 45,661 applications and an increase of 1,679 over 1896 in this country.

In submitting his report, Acting Commissioner A. P. Greeley makes a number of recommendations which if acted upon and passed by Congress, would greatly improve the efficiency of the office and increase its field of usefulness. The Commissioner's suggestions are timely and based upon years of active experience in the service of that branch of our Government, and therefore deserve careful consideration. Among these suggestions are the following worthy of special mention: "The Patent Office should command the highest order of talent, and no such body of men as compose the examining corps of the office can be anywhere else brought together for anything like the salaries here paid them. The corps is unsatisfactory only in numbers and permanence." He commends the classification of patents, such as is practiced by the English Patent Office, and says that no public money is asked for or needed for this purpose. The income of the Patent Office is ample for this and every other need. He urges the enlargement of the library so as to increase the efficiency of the search department, which is also inadequate in numbers.

The number of interferences brought before the chief examiner in 1849 was 815, which is additional work for this official and his four assistants, and the Commissioner is of the opinion that the Patent Office should be relieved of this interference work. It has not the proper machinery for conducting such proceedings. A bill providing for the creation of a court independent of the Patent Office for the trial of these cases is now before Congress and should receive favorable consideration. The British Patent Office publishes, in book form, abridgements of patents relating to the various classes of invention. Nearly every Commissioner of Patents for the past forty years has recognized and urged the necessity for the publication of like abridgements or United States patents. They would be of very great value not only to the examiners in the office and to inventors, but to the general public. He urges further, the printing of a large edition of the official gazette, the expense of which would be but little more than the cost of paper and press work. These copies, properly distributed to libraries and other public institutions, particularly schools in which mechanic arts are taught, would be of substantial service to the public.

He deplores the condition of the scientific library

which, though perhaps unsurpassed by any similar library in the world, is yet far from complete and satisfactory.

As during the past year a number of the most efficient examiners of the office have resigned, because of salaries paid, the Commissioner hopes for speedy action by Congress to lessen or eliminate such occurrences in the future, by giving the men salaries commensurate with their abilities and duties. He touches further upon the necessity for a patent bar upon necessary changes in the new patent law and laws regarding trade marks.

A very interesting, though not quite up-to-date portion of the Commissioner's lengthy report is that dealing with the development of industries through patented inventions and the creation of new ones. He devotes entire chapters to the development of the electric railway, the telephone, copper wire and aluminum industries. He tells us that since 1880, 28,457 patents have been granted relating to electrical matters, which represents an income of just one million dollars to the Patent Office and about one and a half millions to the attorneys. Considering these vast amounts of money spent by inventors and companies for having their ideas and rights protected, it certainly seems reasonable to demand prompt action on the part of Congress for providing sufficient revenue to meet the growing and imperative needs of the Patent Office.

Let our lawmakers remember the words of the Hon. A. P. Greeley, that "It is to the stimulus to invention given by our patent system that the great increase in our exports is largely due, and it is on American invention, as fostered and stimulated by the patent system, that we may confidently depend for ability to maintain the high rates of wages paid to American workmen and yet compete successfully in the markets of the world with nations where the workman receives but a meagre return for his labor."—*Electrical Engineer*.

## American Merchant Marine.

From data collated from eight ship building yards in the United States by the New York Commercial, located on the Atlantic and Pacific Coasts, not less than thirty-six American steamships are being built, six for foreign account, and twelve vessels under construction for the Government. The American merchant marine will have 100,000 tons added to its credit by the ships now under construction in but eight yards. What is being done elsewhere is out of this total, while new enterprises being projected are not counted either on the lakes or the seaboard. It will be a surprise, however, if American ingenuity and energy does not come to the front in this matter, and with it perhaps the usual failing of crowding the ship building industry beyond the point of stability and profit. The supremacy of the seas is not to be rushed either in a decade or a century, and there is some stout seamanship yet left in other races, and some doughty old Vikings that will continue to plough the main, but with room for all, and an absolute monopoly for none, the marine interests of the United States has all the seaway and destiny it could ask for.

## For The First Time.

For the first time an English railway company has printed a 24 hours' time-table. This is the Great Easterns Company's table of the new direct service to Spa. Thus we read that the service from Spa leaves at 44 past 14 and arrives at Antwerp at 38 past 18. The Great Eastern is obliged to print its time-tables, as far as they concern the Belgian lines in this way because the 24 hours' system has been made compulsory on the Belgian State Railways. The system only came into operation this year, and the Belgians have settled down to it. The faces of the railway clocks have been altered to bring them into harmony with the time-tables, and while the old second circle of figures carrying on the time to enumeration to 12 o'clock is retained, there is a second circle of figures carrying on the time to 24 o'clock.—*Invention*

## The Month's Commerce.

The value of the imports of merchandise in the United States during July was \$50,674,366. This was a decrease of nearly \$3,000,000 from the imports of July, 1897. The decrease is in the imports free for duty, as the dutiable imports increased \$7,000,000. The exports in July, 1898, were \$72,486,853, an increase of more than \$1,000,000 over July, 1897. The excess of exports over imports during the month was \$21,812,487. The imports of gold for the month were \$2,613,530, an increase over July, 1897, of \$1,674,579. The exports were \$1,497,013, a decrease of \$3,695,856. The excess of exports over imports was \$1,116,517. The imports of silver were \$3,026,192, an increase of \$332,328. The exports were \$4,879,783, an increase of \$174,629. The excess of exports over imports was \$1,858,591.—*Manufacturers Record*.



## STREET RAILWAYS IN WASHINGTON, D. C.

In all the histories of all the cities of the world I do not believe that there is record of a place in which there have been more different ventures in street railway enterprises than in Washington, D. C. And there are few large cities that have been slower in meeting the public need in this respect than the capital of the nation, notwithstanding the fact that whenever a road has been established here and kept in good order it has seldom failed to pay its projectors.

Something over thirty years ago the streets of this beautiful city were much in the condition described by John Randolph, before this time, when he called Pennsylvania Avenue the Serbonian Bog, a trip over which (the avenue) he said was attended with no little danger.

During the civil war the first street railway employed in Washington was built. This, of course, was a horse road, and ran from the Navy Yard to Georgetown (now west Washington) a distance of about five miles. When the charter for this old road was being sought the people living along the avenue objected to its being granted, saying that that thoroughfare, one of the widest in the city, would be ruined. This was progress! But the road was built, and for nearly thirty years the jingle of the horse car was heard up and down the great avenue, until the cable system gave the horse a rest and ushered in a surer, quicker means of street travel.

In the meantime horse lines were established in various parts of the city, beginning with the one-horse bobtail car, and so continuing for many years. In fact even now there can be seen a little "ancient" bobtail car drawn by a single bony animal that hauls its burden over six miles of track, from the neighborhood of the great government gun factory up through many fine business and residence streets.

The "one-horse shay" was, in most cases, after years of trial (to the horse,) improved on by the addition to the "independent power plant" of another animal. This system is still in vogue on the Belt Line and a portion of the Eckington and Soldier's Home road. The first of these embraces nearly six miles of double track, which extends through important parts of the city. The Eckington and Soldier's Home presents the unique feature of a combination horse and electric railway having its progressive portion (the electric) in the country, and the animal power part, in the city. This strange state of affairs is due to an order from the District Commissioners compelling the railway company to take down its poles carrying the overhead wire, by which for a number of years the cars were operated in the city.

Though now so far behind in street railway progress in Washington, the Eckington and Soldier's Home road was the first to introduce in the District electricity as a motive power for street cars. It antedated the admission of the cable here, and was hailed as the solver of the rapid transit problem. And so it was. But the rapid transit of this road was a thing of the past when the horse was substituted for its original power. Since then it has experimented with the air motor, which was discarded after a long trial, and now it is said that it will soon put in operation the underground electric system.

This road—which has 7-13 miles of double track and 1-57 miles of single track—also, at one time experimented with the electric storage system, as did the Metropolitan road, now considered one of the best (if not the best) in the world.

Less than fifteen years ago the Metropolitan employed the bobtail car system, and less than three years ago its cars were being drawn by double team over some of the principal business streets and by the mansions of the bon ton. In vain did Congress command this company to change its motive power for something better than the horse. Dates were set for this change, but when the "evil day" came the Metropolitan road always found a champion among the legislators, who moved for an extension of time for making the required improvements, and got it. But at last this road adopted the underground electric method, a modification of the Budapest system, and ere long its cars driven, heated and lighted by electricity, began to glide over the asphalt with great speed and a smoothness that is seldom, if ever, equaled in street railway travel.

The Metropolitan road has 10-21 miles of double and 3-70 miles of single track, over which are operated 156 cars, each car making an average of 124 miles a day. The power plants are splendidly equipped and are contained in two fine large brick

buildings. The amount of coal used for one days work is 36 tons.

The underground system employed by this company was first used in Washington, where its success has been fully demonstrated. In New York a road on the same plan has been built. These two are the only roads of their kinds in existence. Of course there are other underground systems employed, notably (in Washington) that now used in place of the cable, on Pennsylvania Ave; that on U street;—about one mile in extent—also the Washington, Alexandria and Mount Vernon—with 0.90 mile in the city, and the Capitol, with 1-32 miles of single track. The underground system of the Capitol Traction (Rock Creek Washington and Georgetown) is working in a most satisfactory manner. This, the oldest street railway in the District, has done no experimenting. After its long period of horse-power work it took up the cable, and when its Pennsylvania Avenue power-house was burned out, the underground electric method was chosen and as soon as possible put into operation. It is safe to assume that systems of this kind (underground feed) will at sometime in the not distant future be in general use in Washington, although there is little doubt that motive powers yet to be born will besiege the doors of Congress that they may be allowed an experimental chance on the streets of the Capital.

As I mentioned in the beginning of this article, there have been numerous attempts to establish new methods of street car power in the District of Columbia. Among these were the pneumatic idea embraced in the Judson patents; the independent storage battery; the electro-magnetic system; the Pole gas motor, and the compressed air method. All of these took a hand at the wheel, and all of them failed to turn it to a permanent motion.

The Judson plan embraced a continuous circular shaft, extending under the surface, to be revolved by a series of pneumatic engines and compressors arranged at certain intervals along the line; the shaft was straddled by arms depending from the car and arranged so that one sloped toward the front, and the other toward the back of the car, while bearing against the shaft and making a friction resistance as the latter revolved and so "pushed" the car forward—or backward, when the position of the arms was reversed. This was not given a very extensive trial and early left the land of street railway possibilities.

The electric storage plan had a number of things against it. It was too heavy, too costly, and had to be taken to a central station for recharging. This was given a fair trial by the Eckington and Soldier's Home road, which much experimenting company furnished power for the Electro-Magnetic system, sending the current for this purpose about a mile on overhead wire to where it supplied a series of contact plates arranged at intervals in the middle of and along the railway track, so that when each plate, or box, was reached by the car the depending conductor made the connection and transmitted the current to the armatures. The cars on this road—extending about one mile along North Capitol Street—were run at good speed and for several months were engaged in daily passenger service. But like some of its predecessors the electro-magnetic idea failed to find a permanent foothold.

The gas motor was never employed in Washington for hauling passenger cars. For some little time it was experimented with, but it seemed to possess an "inherent" weakness that could not be successfully overcome. Yet there is no doubt that a motor of this nature can be easily operated. By this power street cars have for a long time been run in Switzerland and Germany, at a cost that compares favorably with the outlay for horse lines. It is said that the cars run by gas make a maximum speed of eleven miles an hour, and that by taking their gas at the street mains, do away with the necessity of going to a supply station when the quantity carried is exhausted. The cost of running such motors is said to be less than that of the overhead trolley—about \$1.05 to \$1.09 per 1,000 feet of gas.

The air motor, as tried upon the Eckington and Soldier's Home road, demonstrated its ability to carry passengers and to be safely operated, notwithstanding the fact that the public were somewhat uneasy concerning the air flasks employed with their enormous pressure charge. But this means of propulsion failed to meet the requirements of a good independent power for street cars. Besides the cost of operating a system of this kind, upon being investigated by the District Commissioners, was found to be greater for the road here mentioned than that of an underground electric system for the same purpose.

In the report on this matter it was stated (as far as accurate figures could be obtained) that to equip the Eckington and the Belt Line roads with the air motor system, it would cost \$589,430, as against \$1,443,000, if the underground electric was adopted. But the cost of operating the former was estimated at \$450,702, while that of the latter amounted to only \$295,737.

Suburban Washington is ramified by numerous overhead trolley roads that have their bases of passenger supplies in the city proper. And still the "promoter" seeks the corridors of the Senate and House with new plans for street railways for indorsement by those legislative bodies. JOHN QUILL.

## Electricity and Religion.

Capt. Charles L. Albertson, of the Eleventh Police Precinct, is a well known student and collector of rare books, says the New York Times. His private office in the Mulberry street station house contains a lot of interesting volumes, many of which are of great intrinsic value, while others are notable because of unusual features. In an old bookstore the other day the captain came across a peculiar book bound in metal, with what seemed to be an electrical appliance at one end, which he immediately purchased. The volume proved to be a copy of the Protestant Episcopal Book of Common Prayer translated into the language of North American Indians in Dakota, and published in 1883 by the New York Bible and Common Prayer Book Society for the Indian Commission of the Protestant Episcopal Church, for use in the missionary jurisdiction of Niobrara.

The covers of the book had been carefully reinforced with substantial plates of nicked brass, firmly fastened with five strong rivets on each side. At the top of each cover was an appliance for the insertion of an electric wire.

According to the story told to Captain Albertson by the seller of the book, the work was used in its present form by a missionary to the Indians in connection with an electric battery. While the unconvinced brave, whose soul the missionary desired to save, held the prayer book with his hands on both covers, thus forming an electrical circuit, the latter would surreptitiously turn on a gentle current which sent mild, but appreciable, thrills through the frame of the savage. These he believed to be manifestations of the newly-found religion.

None of the officials in the Church Mission House, the headquarters of the society which printed the work, and the centre of Episcopal missionary effort in this country, to whom this book was shown, could offer any explanation as to the purpose of its metallic attachments, but all admitted that it had to do with the application of electricity to something in some form or other. Each one insisted, however that no missionary would be guilty of any such deceit or chicanery as suggested toward the people under his spiritual care. At the Bible House, also where all are familiar with religious works of every description, not even a guess at the solution of the mysterious object of the curious book would be hazarded.

## Language and Literature in Philippines.

According to a Spanish missionary, who resided eighteen years in the Philippines, there is no language that is common to all the islands, but each canton has a dialect peculiar to itself. All these dialects, however, have some affinity, somewhat like that which exists between the Italian dialects of Lombardy, Sicily, and Tuscany. On the island of Luzon there are six dialects, some of which are current in the other islands. The most universal are the Tagala and Bisaya. The latter is very coarse, while the former is more polished and better, and to such a degree that a Roman Catholic missionary who had a thorough knowledge of everything pertaining to the islands was accustomed to say that the Tagala language had the advantages of four of the principal tongues of the world: that it was mysterious, like Hebrew; that it had the articles of the Greek, as well for appellations as for proper nouns; that it was as elegant and copious as Latin; and that it was as well adapted as Italian for compliments and negotiation.

The natives make use of but three vowels, and have but twelve consonants, which they express differently by placing a dot above or below them. They have learned from Europeans to write from left to right, instead of from top to bottom, as they formerly wrote.

Palm leaves were formerly used for paper, and an iron style for a pen. They use writing for correspondence, only, as they have no books of science or history. The missionaries have had religious works printed in the various dialects of the islands.

The natives of the Moluccas have a very pleasing way of corresponding with their friends. They arrange flowers of different colors in a bouquet in such a way that the receiver understands, by examining the varieties and their shades (which represent so many characters), what his friend intended to say to him.—*Scientific American*—

A new bicycle saddle has been invented made of a fluid-tight cushion, filled with glycerine, and inclosed by a leather covering making a flexible seat.



**Liquid Air for Blasting.**

F. Linde, who has been so successful with his oxygen and air liquifiers, recommends liquid air cartridges for blasting operations. The liquid is absorbed by coal, which it rends when excited by a primer. The liquid air can, however, not directly be mixed with the carbon, as there would be violent spitting. Cotton wool is charged with three times its volume of powdered charcoal and the mixture fitted into cartridges. The oxygen is poured on the spot from steel cylinders in which it is transported. The pouring in takes place through a paper tube. A primer of mercury fulminate and a Bickford fuse are then fixed in position. From 5 to 15 minutes may elapse between charging the cartridge and blasting.

**American Glass the Best.**

"It is frankly admitted here that American cut glass is finer and more elegantly cut than any manufactured on the continent of Europe, or even in England, says Consul General Hurst, of Vienna, in a report to the State Department. "These people say that this matter is being taken seriously by the manufacturers here, who are already beginning to look elsewhere for a market for their goods. The same is true of plate glass, looking glass plates, etc. Hitherto manufacturers in Central Europe have done a lucrative business in this line with the United States, that country affording them their best markets; but now, many of the factories are closed or running on half or quarter time, and the plants can be bought for 50 per cent. of the amount they would have brought six or seven years ago.

"Figures for the fiscal year ended June 30, 1897, show the exports in glassware to be \$13,180 less than they were the preceding year—that is, in the exports from this district alone—while for the single quarter ending September 30, there was exported to the United States from this district but \$21,270 worth of glassware, as against \$32,627 for the corresponding quarter of 1896. Those interested in and well informed upon the subject are not slow in giving their opinion that this decrease will be even larger in the future, for they say American goods are becoming too popular and are too well made for the foreign-made goods to stand much show in competition.

"These statements are based upon data given me by intelligent manufacturers and shippers who live here, and are corroborated by the export returns from his district."

Belting is now made by impregnating canvas with liquid celluloid. It is claimed that the resulting material will not stretch and gives a good grip, and is at the same time waterproof and not affected by oil or by ordinary variations of temperature. The celluloid not only strengthens and protects the fibre, but acts as a cement to unite together the layers of material of which the belt is made up. The new belts have been patented by the American Pegamoid Company and are first-class.

**New Patent Law in Austria.**

The new patent law which was recently passed in Austria comes into force on the 7th of January, 1899. Substantially the same as the German law on which it seems based, it constitutes a board of examiners who have power to grant or refuse patents. These are granted for 15 years for inventions that can be used industrially, but not for articles of food, medicines, or substances produced in chemistry where no new technical process is introduced. On the other hand, if the patent be granted for a

process it covers the products directly produced by such process. Patents will not be granted for anything which has been publicly described or exhibited in any other country. The war authorities have the right to use for their own requirements inventions relating to arms, ammunition, fortifications, ships, etc., such compensation being paid as is deemed reasonable. The Patent Office has power to grant licenses compulsorily where the patentee refuses to do so. It has also power to annul patents and to decide questions of validity. Opposition to the granting of a patent may be entered within two months of the publication thereof. The renewal fees commence at about £3 the first year, and increase to £35 for the fifteenth year. There will be no compulsory working of the patent under this new law.

The report of the Commissioner of Pensions soon to be issued shows that on June 30, 1898, there was 976,014 pensioners on the roll. To this must be added 6,852 original claims pending and to be passed. Also additional 762 restoration cases.



GODDESS OF LIBERTY—NATIONAL MUSEUM.

**A Pigmy Locomotive.**

What is claimed to be the smallest locomotive for drawing passenger cars has been built by T. E. McGarigle, of Niagara Falls, and the small steam road is to be operated at the Trans-Mississippi Exposition, in Omaha. In all, six locomotives are to be built. It is possible that they will be used also at summer resorts, such as Coney Island, Atlantic City, and other places. The road in Omaha is about 1,100 feet long. The locomotive from the point of the pilot to the rear of the tender is 7 feet 3 inches long, and it weighs about 600 pounds and can draw ten cars, each containing two persons, or a weight of about 4,000 pounds. From the top of

the stack to the rail is 25 inches and the gage is 12½ inches. The steel boiler is tested to 300 pounds in pressure and works at 125 pounds. The boiler is of 1½ horse power, and it will hold 24 gallons of water. The feed water is supplied by two injectors and there is a steam brake between the drivers. The cylinders are 2x4 inches. The wheels of the forward truck are 5 inches in diameter. The tank in the tender holds 30 gallons of water, and the operator sits on the tender. The scale is about one-seventh of a full sized locomotive, and the type selected is one of the latest engines on the New York Central road.—*Scientific American*.

**Why Women Faint.**

When a woman faints in church, almost the first suggestion is, "Cut her corset strings." Everybody knows what the trouble is; the poor creature cannot breathe. It is not because the air is so bad that she faints. In that case everybody would be affected. It is because she is so constricted by her clothing that she cannot breathe the air that is there. When a man faints in church, who ever heard of the suggestion, "Split up the back of his vest"? There is no such thing as wearing a corset without injury, since we are not made of wood, or stone, or something too hard to be harmed by bandaging. The soft, yielding body that responds to the slightest pressure can not be subjected to any restriction without damage.—*Health Journal*.

**An Aluminum Yacht.**

A twin-screw steam-launch entirely of aluminum has just been constructed in Zurich for the German Colonial Society. It is intended for service on Lake Victoria Nyanza, and it is to be fired with wood. Technically the pinnacle, which is 43 feet long, 9 feet wide, and 5 feet deep, as a noteworthy accomplishment. The whole vessel, with the boiler and engines, of which she carries two, can be taken to pieces and all the separate parts securely fastened together again simply with screws. The hull consists of nine parts, no one of which weighs more than 350 lbs., while the boat completely fitted out for a five hour's journey weighs only 7 tons. The two engines, which work independently, are together of about 27 horse-power. With a crew of 12 men, and loaded with fuel for 10 hours, it attains 9½ miles per hour, and can carry 50 person on board besides cargo. The total cost of the boat is about £1,800.

**Alaska's First Locomotive.**

The first locomotive to turn wheels in Alaska pulled out of Skagway on Wednesday, July 20, with two flat cars loaded with rails. At that time seven miles of the road-bed had been graded, and five miles of track laid. Fifteen hundred men are at work in the heavy rock cutting at the summit. Two tunnels and much rock work will be necessary before the summit is crossed. It is expected that the track will reach the summit of the pass by Sept. 20. The road is narrow gauge, and is being

built by the White Pass & Yukon Railroad Company. According to latest accounts, the company was arranging for an excursion of several hundred people over the road on August 10 as far as the track was completed.

The first works in Europe for the application of an American process for the manufacture of non-flammable wood, erected by the British Non-Flammable Wood Co. near the Middlesex end of Wandsworth bridge, were formally opened last week. The process consists of removing the natural juices of the wood and replacing them with certain substances which not only make it fire-proof, but also have antiseptic properties that prevent decay.



## GOLD FROM THE OCEAN.

A new way to get gold (from the public) is thus discussed by the *Scientific American*: The lust for gold has always been a marked characteristic of the human race, and in the nineteenth century it has been greatly aggravated by the discoveries of gold in California, Australia, Africa, and in the Klondike. Besides the men who bravely battle for gold in the mining camps there are others, fortunately very few in number, who aim to arrive at affluence by an easy path. It is strange that in the present century, with all our scientific knowledge, there are those who still cling to the old belief of the alchemist that they can transmute a base metal into gold, and in their endeavor they waste their lives, their substance, and even the substance of credulous friends. There are still others who spend their time in imposing bogus experiments on gullible dupes who allow themselves to invest their money in the most crack-brained schemes.

We have now to relate the most extraordinary story connected with the production of gold, which should be a warning to all who do not see in such affairs the specious combination of science and the wily swindler. We refer to the Electrolytic Marine Salts Company, which has recently attempted to extract gold from the sea, though the resulting gold in reality came from the pockets of the shareholders. The sensational debacle of the principal promoters of the company has produced considerable comment.

In 1872 Sonstadt discovered the minute presence of gold in sea water, and this was confirmed by Prof. Liversidge, of the University of Sydney, who found that in the sea water of New South Wales there was from one-half to one grain of gold to one ton of sea water, or 130 to 260 tons per cubic mile. Prof. Liversidge estimated the bulk of the oceans of the world as 308,710,679, cubic miles, and if each ton of sea water produced one grain of gold the aggregate amount would be \$48,000,000,000,000, being 23.22 grains fine to the dollar. After this discovery, it is, of course, natural that scientists should have made attempts to secure the precious metal, by treating the sea water chemically and electrically, but it was soon discovered that such processes would be wholly impracticable, owing to the great expense attending the extraction of the gold from the enormous bulk of liquid. The matter should have ended here, but it got to be pretty well understood by the public that sea water contained gold. This fact afforded an ideal chance for the alleged inventor to devise a process for extracting the gold. A few months ago the Electrolytic Marine Salts Company was formed, and the good people of New England were asked to become shareholders, and soon nearly \$1,000,000 of the \$10,000,000 capital stock was subscribed. The enterprise belongs to the class which depends for success upon a secret process, which is in itself often a suspicious circumstance. Moreover, the men who devised the scheme for the extraction of the gold did not belong to the class from whom we are wont to expect great things in processes which require scientific attainments. Experiments were conducted near Providence, and a New York daily paper has been enabled to give a full outline of the ingenious trick. The capitalists were allowed to see the workings of the alleged invention. They were taken to a shed built on an old dock, and they were allowed to bring their own mercury and put it into the submarine tank, which was brought up to the surface by a winch. After the tank was properly arraigned, it was lowered to the bottom and the current was turned on, and the investors sat around to await results. A diver, who has now fled the country, walked on the bottom of the sea at this point and substituted mercury specially prepared with gold for the mercury which the gentleman had furnished. When the tank was brought up to the surface, the mercury was given to an assayer and \$4.50 worth of gold was found, which was considered a very good sum for a single "accumulator." Capitol now came easy after this; so that a large plant was erected at North Lubec, Me., so as to get "fresh" sea water. One plant had 240 accumulators work. They are so located that the tide water passes through them and it is treated with chemicals and electricity, that never-failing aid to bolster up secret processes. It was claimed that gold and silver, one part of the former to two of the latter, were extracted from the water and that these metals were removed from time to time about once a week. It was held as a theory that a ton of sea water contained four cents worth of gold. It was claimed as a practice by the company that four mills' worth was taken from each ton of water and that each accumulator earns on an average \$1 net a day. Each accumulator separated and used about twenty tons of sea water an hour for sixteen hours out of every twenty-four. It was claimed that the

consumption of chemicals was very small. The machines appeared to do their work miraculously well, and each week a gold brick worth nearly \$200,000 was sent to the city. The weekly gold brick was about the same weight and value which showed that the machinery was working remarkably well and that the amount of gold in the water was a constant quantity, and the sixteen consignments netted \$23,000. Finally the vice-president and general manager's financial operations in New York aroused the suspicions of the banks, which led to his flight and the discovery of the swindle, and both he and his diver sailed for Europe; and the deluded members of the company, who believed that the scheme was feasible and went into the business in good faith, are now going to work the plant themselves before they decide to admit that they have been deceived by perhaps the most astonishing and picturesque swindle of modern times. The moral to be drawn from this is that persons should not invest in any electrical or chemical process which they do not understand, until they have asked the opinion of some expert and for whose opinion they can well afford to pay.

## Cotton Manufacture in the South.

Mr. Richard H. Edmonds, editor of the *Manufacturers' Record*, writing from New York to his paper, gives some statements made by Mr. William C. Lovering, a leading cotton-mill owner of New England, about the South's advantages and about improved methods. Mr. Edmonds says:

About five or six years ago, when the success of cotton manufacturing in the South first made its deepest impression throughout New England, the attention which it received was largely due to the impetus given by the views of Mr. Wm. C. Lovering, at that time president of the Arkwright Club, an organization composed of the leading cotton manufacturers of that section. Mr. Lovering made a careful study of the South and its advantages, and did not hesitate to tell his New England associates that the South had even greater advantages for this industry than had generally been claimed. It was through him that the well-remembered "Arkwright Club" trip, which was initiated by the *Manufacturers' Record*, was arranged four years ago, when a number of leading mill men spent nearly two weeks on a special train carefully investigating the South's cotton mills. As a result of that trip and of Mr. Lovering's hearty commendation of the South, several great cotton mills have been built in the South, and other New England companies are now preparing to locate there. At least half a dozen companies are now figuring on building mills in the South to cost \$500,000 or more each. Probably no other cotton man in New England has been a more firm and unwavering friend of the South as a location for cotton mills than Mr. Lovering. Standing, as he does, as a pre-eminent expert in cotton business, he and his family having very large interest in cotton mills, some of which the writer believes have been in this family for a generation or two, his views naturally carried very great weight in favor of the South.

Nearly three years ago Mr. Lovering was interviewed by the *Scientific American* on improved methods of cotton handling, and in a somewhat prophetic vein said:

"In no department of manufacturing is their greater opportunity for improvement than in the condition of the staple itself as it is shipped from the South. Cotton is one of the most delicate fibers in the world, and yet there is no article of commerce that is so brutally handled, from the moment it is picked until it arrives at the mill. The fault is with the manufacturers. They demand nothing better than they get, and they get nothing better than they demand.

"Some day the manufacturers will wake up to a realizing sense of their wrongs and demand that their raw material shall be delivered to them in better condition. Then some enterprising shipper will make haste to lay down in our mills clean cotton, well baled, and billed at net weights. Just, now, however, it is easier to say 'it cannot be done' than that 'it must be done.' We must insist that our cotton shall be delivered to us in a more advanced stage of preparation. The cotton need not cost any more by reason of this demand. The cheap negro labor of the South should be able to do all that is necessary.

"The future cotton mill on white work will have no picking room. The first process in the New England mills will be carding: The cotton will be brought from the cylindrical press in the South in a thoroughly cleaned and evenly rolled lap of a standard weight, of a given number of ounces to the yard, and of a standard width, say, forty inches, ready to be placed up to the card. The silver coming from the card will be as even as that now coming from the first drawing. There is a

chance for the inventor to devise an efficient evener somewhere between the feed-roll and the coiler.

"This much can be said, that the last twenty years has witnessed the fulfilment in the manufacturing world of predictions quite as startling and chimerical as any that have been stated. A few years hence, when all of these and many more wonders shall have come to pass, some one will arise, and, standing on the vantage ground of their realization, point out new worlds to conquer, new miracles to be wrought, new difficulties to be overcome and new forces to be applied. In due time human ingenuity will have met every demand, and so the work of infinite development will go on.

"One by one nature yields up the treasures of her storehouse to the master hand of man.

"Who will dare to set bounds to the unexplored fields of science or limit the human intellect in the scope of its research?"

## Trade in Egypt.

Egypt has for many years been a bone of contention among European powers. Napoleon massed legions in sight of the Pyramids. The guns of Nelson were heard by the Arabs. Alexandria smoked with British shell and Wolseley routed Arabi in the battle of Teber el Kebir. Gordon marched to Khartoum where Moslem spears pierced a knightly creast and a scimitar beheaded as pure and noble a man as ever headed a crusade for liberty. Hicks left a slaughtered army in the sandhills and now Kitchener has completed the great tragedy of war in the defeat of the Moslem hosts of Osman. Meanwhile Lesseps built the Suez Canal, the main highway of commerce between Europe and Asia, Baconsfield made British interests supreme and thence forward the building up of a new Egypt has been carried on. Irrigation enterprises have reclaimed thousands of arid acres, the cotton industry has been stimulated; sugar factories have been built, railroads constructed, telegraph connections ensured with remote points, bridges span the streams and electric tramways are now running in the streets of Cairo and Alexandria. The people are protected in their personal property and rights, and the Egypt of day is becoming a brighter spot than in the days of Pharaoh, Moses or Cleopatra. The nomadic Arab and the semi-savage Dervish are making way for an industrial evolution in which the plow will supersede the spear, and an orderly government, that of rapine, riot, slavery, fatalism and anarchy. Whatever may be the politics involved in the present and future government of Egypt, one thing is beyond controversy that under its present rulers it has awakened from the lethargy of centuries and is fairly in line with such Oriental countries as may be coming out of the chrysalis of effete civilizations. On the ratio of population it has more railway mileage than Spain or Austria, Hungary, and in the matter of imports can show an increase of one-hundred per cent in twenty-one years. According to the New York Commercial, the imports for 1896 amounted to £50,900,000. Their sources are thus tabulated:

Country	Value.
England.....	\$18,508,700
Turkey.....	9,985,000
France.....	6,060,000
Austria-Hungary.....	3,520,000
Belgium.....	2,290,000
Russia.....	\$852,000
Italy.....	1,659,000
Germany.....	1,308,000
Greece.....	405,000
United States.....	215,540

These imports embrace a wide variety of articles from locomotives to writing paper, and from electric machinery to type-writers, wheel-barrows, and chewing gum. The lumber imports for the year named represented a value of \$2,192,000: iron and hardware, \$2,355,000; machinery \$2,104,000; copper and brass goods, \$545,000; soap, \$450,000; furniture, \$230,000, and coal, \$2,125,000. In all these lines there is more or less of an opportunity for American exporters. The United States exports from Egypt a considerable amount of cotton. In the year 1896 this trade represented 50,339 bales; for the same period, our exports to the same country were classified as follows:

Agricultural implements.....	\$17,147
Iron, steel machinery.....	13,481
Oil.....	99,498
Perfumery.....	134
Spirits, distilled.....	6,028
Woods and manufactures of.....	29,117
All other articles.....	50,198

Total..... \$215,540

This is a poor showing in comparison with our opportunities, but now that a stable form of government is more or less assured, and the gates are open from Cairo to the Soudan for industrial development, it is not likely that the United States will neglect its business chances along the Nile.—*Age of Steel.*





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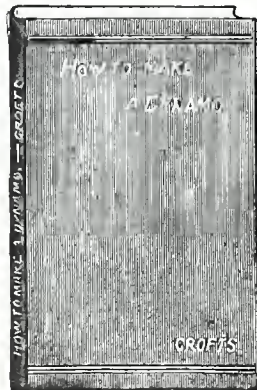
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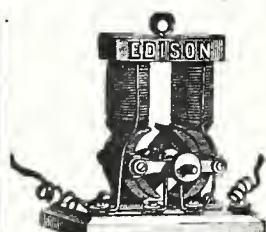
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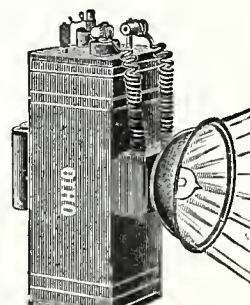
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# The Inventive Age

## AND PATENT INDEX.

Ninth Year. {  
No. 10. }

WASHINGTON, OCTOBER 15, 1898.

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### PATENT OFFICE MANAGEMENT.

The condition of business in the United States Patent Office is deplorable. The only reason why it is not in as bad odor as the Medical and Supply Bureaus of the War Department, is because it is less conspicuous than they are. If the search light which is now turning the War Department inside out could be made to bear on the United States Patent Office there would be sensation, consternation and official decapitation. In many divisions of the Patent Office the work is months in arrears, and it cannot be denied that this condition is due, in the main, to the negligence and idleness of many of the examiners.

In mental and educational equipment, the present examining corps is, perhaps, the ablest in the history of the United States Patent Office, but, many of them, apparently secure in their cloister-like offices, are dilatory, and negligent of the work they are paid to perform.

The Patent Office is sorely in need of investigation and firm aggressive supervision. Once or twice in the recent history of the Office it has had a Commissioner of Patents capable of bringing indolent examiners to their work and holding them there. Less than four years ago the work in the office had been suffered to lag. The Commissioner of Patents issued an order that it must be brought to date within a certain period, or the employees would be put on extra working time without extra pay. The result was a remarkable acceleration of business and inventors who had been waiting for months for actions on their cases then had them acted upon with business-like promptness.

Through wise selection and promotion, the personnel of the Patent Office has reached a hitherto unattained excellence, and there could be no better or wiser policy than that suggested by Assistant Commissioner Greeley, in a recent report, to secure, by an increase of salary, the rare technical, special and legal talent that characterizes the present examining corps. If it were possible to have, in connection with this, a non-political Commissioner of Patents, thoroughly familiar with Office rules and routine, with great and contagious capacity for work, and appointed for life, a much higher ideal of Patent Office management would be attained.

Aluminum after its discovery in 1855, was about \$5.00 an ounce. From 1857 to 1886 it was about \$10.00 a pound. The present price is about 25 cents, and it will be cheaper.

### France as a Market.

The following is a copy of an undated report by Consul Brunot, of St. Etienne, made in answer to requests for information from the Philadelphia Museums.

In a recent publication on the extension of markets for American goods, it was alleged, in effect, that the older European countries might be considered as exploited territory, already well supplied and but little likely to return a reward for the efforts of Americans seeking new outlets for their products. It is to be hoped that such a statement will not be generally accepted. It is far from being true in this section of France, at least, and doubtless in other parts of Europe as well. The success achieved in many well-known lines indicates altogether a contrary state of affairs. Europe needs the best goods in the world's market, and in many instances the superiority of American manufactures is not to be longer questioned.

As long as farming is carried on with wooden plows and ox carts, made after the style of Cæsar's time, there is room for modern utensils. Plows and ditching machines are needed here.

The modern farm wagon would accomplish more towards relieving the agricultural depression than will government subsidies. If there is any good reason why American light road vehicles should not be preferred to the weighty carriages now in use, it is not apparent. The French two-wheeled freight cart, drawn by two horses, hitched tandem, is so heavy that the full strength of one animal is required to support the ponderous shafts and to steady the ungainly vehicle. The other must draw the load alone, the waste of power being evident. Were it not for the excellence of the almost level roads, such means of transport would be impracticable.

Wooden shoes are the usual foot wear in the interior of France, are not an exception even in the towns.

Paper products of certain classes might find a market in St. Etienne, Le Puy, Montbrison, and Lyons; especially packing and wrapping papers, ribbon rolls, piece-goods wrappers, lace rolls, dry-goods box stock, cardboard, and a peculiar grade of pulp board used by "lisseurs," or pattern makers for looms. There is no paper-box machinery in this city; though immense quantities of small dry goods boxes are used, they are entirely handmade. Steam-laundry machinery is unknown in the interior cities of France. All the washing is done in a primitive way, by women at the edges of streams, which often

happen to be several miles out of the cities.

Barber's chair, if introduced, would be the cause of bringing down blessings upon the American inventor.

Roller window shades might succeed in replacing the present suffocating tapestry hangings, especially amongst unpretentious householders.

England still enjoys the local reputation for building the best steam engines in the world, though they are often but copies of American designs.

American brick machinery should be able to supercede old hand methods, here as elsewhere. File cutting and bolt machines might also be considered favorably by local French mechanics.

Building hardware is another subject that deserves attention. The ponderous and insecure door and other locks in universal use, even in new buildings, would be museum curiosities in America; they are a perpetual nuisance here. (The writer's bunch of keys, five in number, necessarily carried about all the time, weighs a trifle more than a half pound.)

There are two elevators in the city, and one of these is more than out of date. Yet lofty buildings are the rule for both factories and dwelling flats.

It is true that we make and use many articles in America that the French people would have no use for, and which it is fruitless to offer to them at any price; but it is undeniable that exportation to Europe can be expanded in the directions above indicated, and in other lines as well.

### Science or Pseudo-Science.

In digging deep into nature the material world and the forces operating are found, which we believe to be in the main heat, light, electricity, life and spirit, the last named being the supreme, creative, dynamic, directing force of all.

The gulf between what is usually termed the known and unknown is not so great, after all, as it appears to some, and many mysterious things fade away entirely, when the light of scientific research is turned upon them.

It appears that life, both vegetable and animal, is a dynamic force, and that it comes to the cell under certain natural conditions and departs again when the cell is no longer a fit dwelling place for it.

Some one has said, speaking of spirit, "that it sleeps in the mineral, breathes in the vegetable, dreams in the animal and comes to consciousness in man." The five human senses have their spring of action in the mind faculty of perception, and it is

by these avenues we gain a knowledge of the outside world.

Inasmuch as man stands at the head of the organic world, the highest product and final result, the ultimate of creation and the culmination of all that preceded him in the chain of organic existence, it may be concluded that his brain is a wonderful piece of mechanism, and under proper conditions able to accomplish almost anything.—*W. M. Gross in N. Y. Herald.*

### British Science Association.

During the month of September, the British Association for the advancement of Science held a successful meeting at Bristol. The most remarkable address of the occasion was that of Sir William Crookes, the president. His discussion of the world's food supply has been extensively published and commented upon in this country. He argued that the consumption of wheat was yearly growing greater than its production, and that the requisite nitrate of soda as a fertilizer could be secured by the fixation of the free nitrogen of the air. The distinguished speaker had previously showed, before the Royal Society in 1892, a process by which atmospheric air could be ignited by passing a strong induction current between terminals and in this way produce nitrous and nitric acids. He stated that Niagara Falls could generate "without much lessening its mighty flow" the electric energy necessary to produce the 12,000,000 tons of nitrate of soda required. In speaking of the recent developments of chemical and physical science, the president referred to the discovery of new gases by Ramsay; Recent progress in Röntgen-rays work; wireless telegraphy by Lodge and Marconi; and other epochal scientific discoveries. He mentioned that he had discovered a new earth, which he calls "Monium."

Perhaps the most remarkable part of Sir William Crookes address was that which relates to physic research, and which we quote at length in another column.

It is reported that a use has been found for liquified air. It is now practicable to use it in underground work, such as mining, driving tunnels, and sinking shafts. It is said that under proper conditions the liberation of air from the liquid can be effective in generating power with which to run drills under ground, pumps, hoists, &c., while cool air can also be supplied in the deepest mines. The liquid air can also be used in freezing soft ground, making tunnel cutting less hazardous and tedious.—*Invention.*



## BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

CONCLUDING WORDS OF THE ADDRESS BY SIR  
WILLIAM CROOKES, F. R. S., V. P. C. S. PRESIDENT.

No incident in my scientific career is more widely known than the part I took many years ago in certain psychic researches. Thirty years have passed since I published an account of experiments tending to show that outside our scientific knowledge there exists a Force exercised by intelligence differing from the ordinary intelligence common to mortals. This fact in my life is, of course, well understood by those who honoured me with the invitation to become your President. Perhaps among my audience some may feel curious as to whether I shall speak out or be silent. I elect to speak, although briefly. To enter at length on a still debatable subject would be unduly to insist on a topic which—as Wallace, Lodge, and Barret have already shown—though not unfitted for discussion at these meetings, does not yet enlist the interest of the majority of my scientific brethren. To ignore the subject would be an act of cowardice—an act of cowardice I feel no temptation to commit.

To stop short in any research that bids fair to widen the gates of knowledge, to recoil from fear of difficulty or adverse criticism, is to bring reproach on science. There is nothing for the investigator to do but to go straight on, "to explore up and down, inch by inch, with the taper for his reason"; to follow the light wherever it may lead, even should it at times resemble a will-o'-the-wisp. I have nothing to retract. I adhere to my already published statements. Indeed, I might add much thereto. I regret only a certain crudity in those early expositions which, no doubt justly, militated against their acceptance by the scientific world. My own knowledge at that time scarcely extended beyond the fact that certain phenomena new to science had assuredly occurred, and were attested by my own sober senses, and, better still, by automatic record. I was like some two-dimensional being who might stand at the singular point of a Riemann's surface, and thus find himself in infinitesimal and inexplicable contact with a plane of existence not his own.

I think I see a little farther now. I have glimpses of something like coherence among the strange elusive phenomena; of something like continuity between those unexplained forces and laws already known. This advance is largely due to the labors of another Association of which I have also this year the honour to be President—the Society for Psychical Research. And were I now introducing for the first time these inquiries to the world of science I should choose a starting-point different from that of old. It would be well to begin with *telepathy*; with the fundamental law, as I believe it to be, that thoughts and images may be transferred from one mind to another without the agency of the recognised organs of sense—that knowledge may enter the human mind without being communicated in any

hitherto known or recognised ways.

Although the inquiry has elicited important facts with reference to the Mind, it has not yet reached the scientific stage of certainty which would entitle it to be usefully brought before one of our Sections. I will therefore confine myself to pointing out the direction in which scientific investigation can legitimately advance. If telepathy take place we have two physical facts—the physical change in the brain of A, the suggester; and the analogous physical change in the brain of B, the recipient of the suggestion. Between these two physical events there must exist a train of physical causes. Whenever the connecting sequence of intermediate causes begins to be revealed the inquiry will then come within the range of one of the Sections of the British Association. Such a sequence can only occur through an intervening medium. All the phenomena of the universe are presumably in some way continuous, and it is unscientific to call in the aid of mysterious agencies when with every fresh advance in knowledge it is shown that either vibrations have powers and attributes abundantly equal to any demand—even to the transmission of thought. It is supposed by some physiologists that the essential cells of nerves do not actually touch, but are separated by a narrow gap which widens in sleep while it narrows almost to extinction during mental activity. This condition is so singularly like that of a Branly or Lodge coherer as to suggest a further analogy. The structure of brain and nerve being similar, it is conceivable there may be present masses of such nerve coherers in the brain whose special function it may be to receive impulses brought from without through the connecting sequence of ether waves of appropriate order of magnitude. Röntgen has familiarised us with an order of vibrations of extreme minuteness compared with the smallest waves with which we have hitherto been acquainted, and of dimensions comparable with the distances between the centres of the atoms of which the material universe is built up; and there is no reason to suppose that we have here reached the limit of frequency. It is known that the action of thought is accompanied by certain molecular movements in the brain, and here we have physical vibrations capable from their extreme minuteness of acting direct on individual molecules, while their rapidity approaches that of the internal and external movements of the atoms themselves.

Confirmation of telepathic phenomena is afforded by many converging experiments, and by many spontaneous occurrences only thus intelligible. The most varied proof, perhaps, is drawn from analysis of the sub-conscious workings of the mind, when these, whether by accident or design, are brought into conscious survey. Evidence of a region, below the threshold of consciousness, has been presented, since its first inception, in the "Proceedings of the Society for Psychical Research;" and its various aspects are being interpreted and welded into a comprehen-

sive whole by the pertinacious genius of F. W. H. Myers. Concurrently, our knowledge of the facts in this obscure region has received valuable additions at the hands of laborers in other countries. To mention a few names out of many, the observations of Richet, Pierre Janet, and Binet (in France); of Breuer and Freud (in Austria); of William James (in America); have strikingly illustrated the extent to which patient experimentation can probe subliminal processes, and can thus learn the lessons of alternating personalities, and abnormal states. Whilst it is clear that our knowledge of sub-conscious mentation is still to be developed, we must beware of rashly assuming that all variations from the normal waking condition are necessarily morbid. The human race has reached no fixed or changeless ideal; in every direction there is evolution as well as disintegration. It would be hard to find instances of more rapid progress, moral and physical, than in certain important cases of cure by suggestion—again to cite a few names out of many—by Liebeault, Bernheim, the late Auguste Voisin, Berillon (in France); Schrenck-Notzing, (in Germany); Forel, (in Switzerland); van Eeden (in Holland); Wetterstrand, (in Sweden); Milne-Bramwell and Lloyd Tuckey (in England). This is not the place for details, but the *vis medicatrix* thus evoked, as it were, from the depths of the organism, is of good omen for the upward evolution of mankind.

A formidable range of phenomena must be scientifically lifted before we effectually grasp a faculty so strange, so bewildering, and for ages so inscrutable, as the direct action of mind on mind. This delicate task needs a vigorous employment of the method of exclusion—a constant setting aside of irrelevant phenomena that could be explained by known causes, including those far too familiar causes, conscious and unconscious fraud.

The inquiry unites the difficulties inherent in all experimentation connected with *mind*, with tangled human temperaments and with observations dependent less on automatic record than on personal testimony. But difficulties are things to be overcome in the elusory branch of research known as Experimental Psychology. It has been characteristic of the leaders among the group of inquirers constituting the Society for Psychical Research to combine critical and negative work with work leading to positive discovery. To the penetration and scrupulous fair-mindedness of Professor Henry Sidgwick and of the late Edmund Gurney is largely due to the establishment of canons of evidence in psychical research, which strengthen while they narrow the path of subsequent explorers. To the detective genius of Dr. Richard Hodgson we owe a convincing demonstration of the narrow limits of human continuous observation.

It has been said that "nothing worth the proving can be proved, nor yet disproved." True though this may have been in the past, it is true no longer. The science of our century has forged weapons of observation and analysis by which the veriest tyro

may profit. Science has trained and fashioned the average mind into habits of exactitude and disciplined perception, and in so doing has fortified itself for tasks higher, wider, and incomparably more wonderful than even the wisest among our ancestors imagined. Like the souls in Plato's myth that follow the chariot of Zeus, it has ascended to a point of vision far above the earth. It is henceforth open to science to transcend all we now think we know of matter, and to gain new glimpses of a profounder scheme of Cosmic Law.

An eminent predecessor in this chair declared that "by an intellectual necessity he crossed the boundary of experimental evidence, and discerned in this matter, which we in our ignorance of its latent powers, and notwithstanding our professed reverence for its Creator, have hitherto covered with opprobrium, the potency and promise of all terrestrial life." I should prefer to reverse the apophthegm, and to say that in life I see the promise and potency of all forms of matter.

In old Egyptian days a well-known inscription was carved over the temple of Isis: "I am whatever hath been, is, or ever will be; and my veil no man hath yet lifted." Not thus do modern seekers after truth confront Nature—the word that stands for the baffling mysteries of the universe. Steadily, unflinchingly, we strive to pierce the inmost heart of Nature, from what she is to re-construct what she has been, and to prophesy what she yet shall be. Veil after veil we have lifted, and her face grows more beautiful, august, and wonderful, with every barrier that is withdrawn.

### Typhoid Fever Spread by Flies.

The commission consisting of Drs. Lee, Vaughan, and Shakespeare, which was appointed to inquire into the cause of the camp epidemics of camp fever, has concluded its investigations. The camps at Chickamauga, Huntsville, Fernandina, and Jacksonville were inspected. It was found that the typhoid fever in each instance was brought by the volunteers from their State camps. The water supply was in most places good and was not responsible for the spread of the fever. This was effected, in the opinion of the members of the commission, by the flies which swarmed in all the camps and devoted their attentions impartially and alternately to the faecal matters in the open and not disinfected sinks and to the hardtack and "sow belly" of the troops.

A fire can always be stopped if noticed early by throwing solution of ammonia upon it. This envelopes the burning material with a gas which will not support combustion, and as the volume of gas evolved is some hundreds of times greater than that of the solution itself, the efficacy of even small quantities of the liquid is very great.—*Ex.*

The ancient Greek city of Priene, in Asia Minor, containing a temple of Minerva built by Alexander the Great is being excavated. It is in very good preservation, and is teeming with new curios for antiquarians and historians,



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ISSUED OCT. 4, 1898,

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A full printed copy of drawings and specification of any Patent in this list will be sent on receipt of 10 cents in postage stamps. Preserve this list for future reference and always send number of the patent ordered.

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# *Inventive Age*

## AND PATENT INDEX.

Established 1889.

**C. A. SNOW & CO.,** Editors and Proprietors.,

No. 708 8th Street, Washinton, D. C.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada, Mexico, Hawaii, and Porto Rico, for \$1 a year; to any other country, postage prepaid, \$1.50.

Correspondence with inventors, mechanics, patentees, and manufacturers, is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

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WASHINGTON, OCTOBER 15, 1898.

THE INVENTIVE AGE today appears under a new management. It is our wish to make it a clean, truthful and helpful visitor to many homes, shops and factories. We propose to exercise a censorship over, not only its reading, but also its advertising columns. We wish we could do this with the 20,000 papers published in the United States. If we could, there would be an enormous quantity of expurgated lies, and the millenium of fair statement and square dealing would be close at hand.

The most menacing feature of modern civilization is the tremendous volume and momentum of falsehood through the press. The "art preservative" is, alas! also the art deceptive, the art corruptive, and the art furtive. When we reflect that all these arts are multiplied by twenty thousand printing presses, by steam, electricity, Mergenthalers, pneumatic tubes and pound rate postage, we are, indeed, confronted by a grave condition. Man prefers truth, yes, and woman, too, rather than falsehood. They are, in a degree, according to their gumption selective, and in this may be found our salvation.

We intend to try to tell the truth, and write this to fix our standard, and to commit ourselves to a high ideal—"lest we forget." We have no dead-head railroad, theatre, or hotel tickets in our pockets. There is no reason why we should laud any man's house or hash. We are not at all dependent on this paper for a livelihood, but we hope, in time, that our readers may learn to depend upon it for fair and straightforward statement.

### Rights of Inventors.

Inventors who by the payment of Government fees so munificently endow and support the U. S. Patent Office ought not to be compelled to wait from one to seven months before their applications for patent receive first action. Congress has made the appropriations called for by Acting Commissioner Greeley, and the officials of the Patent Office must now be held responsible for unreasonable delay.

The coldest country in the world is in Werchojansk, Siberia. °98 below Z.

### A TYPICAL LETTER.

No. 414 STATE STREET, HUDSON, N. Y.,  
MESSRS. SNOW & CO., Oct. 10, 1898.  
Will you please give me a word of advice? As you predicted, since receiving my patent on String Case, I have received letters and circulars by the bundle. They all want some money in advance for advertising, etc.  
Some of them keep everlastingly at me. Can you inform me of a good, reliable company or person with which to place the sale of my patent? I will pay you your price for the information, if you will do so.  
Yours sincerely,  
(Signed) G. A. RAPP.

The above is a type of a letter that we receive every day. For years we have been sending each week to all the names and addresses found in the Patent Office Gazette the following letter:

#### A WORD OF WARNING AND ADVICE.

So many of our clients have been swindled by Patent Sale Agencies, that we have decided to send this circular warning inexperienced patentees against their schemes. Old patentees, those who have procured their second or twenty-second patent, do not need warning. Many of them have been taught in the "school of experience" and this circular is not for them. It is particularly for the patentee who has had his name published for the first time in the Patent Office Gazette, and is receiving tempting propositions from Patent sale agencies who look upon a fresh inventor as their prey.

Believe us: none of these people can sell your patent or do you the least good. You will throw away any money you may send them. Do not, as you abhor being duped, waste even so much as a postage stamp with them.

These Sale Agencies NEVER SELL PATENTS, they never even try to sell them. They offer to sell your patent for so much cash, and a commission. Now, if you will not heed our warning and consign their circular to the waste basket, write them and offer instead of the cash in advance, 80 per cent commission, and see how quick they will leave you. By this you will see the "Agency" has no thought of selling your patent. It would rather have \$10 or \$20 than a commission of 90 or 99 per cent contingent on a sale. In other words, they do not value their prospective commission on your patent at anything; they want only the \$10 or \$20 which they hope you may be foolish enough to pay them. We invite correspondence with all patentees who have had experience with these "Sale Agencies" and Patent Swindlers of all classes. We have called the attention of the Government Detectives to a number of them, and we want all the evidence we can obtain. By sending us evidence of their effort or accomplishment to swindle, you will be doing a public service.  
Your truly, C. A. SNOW & Co.

Hundreds of inventors and patentees will recognize the above circular letter. Some have profited by it, some have wasted money on patent sale agencies in spite of our warning, the majority of them have thrown it in the waste basket because they fortunately or unfortunately, knew all about these sale agencies, and did not need our warning; but this last class, better than any other, will attest the soundness of our advice.

We expect to continue through the INVENTIVE AGE our work of detection and exposure of that class of swindlers that subsist on the credulity and gullibility of inventors. Thanks to the detective and administrative genius of Hon. A. P. Greeley, Asst. Commissioner of Patents, the ranks of these rascals have been greatly reduced, but they are still to be found right here in Washington, in Buffalo, in Detroit, in Cincinnati, in New York, and in many other localities. We ask the co-operation of inventors and patentees everywhere in our efforts to rid the country of these sharks and octopi, and we will be glad to have them send us their circulars which we will promptly turn over to the Depredations Division of the U. S. Post Office, and to the Commissioner of Patents. These people, as a rule, cannot now practice before the U. S. Patent Office because, under the new rules they are refused registration, but they pretend to be able to sell patents in the United States, Canada and Europe, and, in this way,

they deceive many. We say positively that they never sell, but their circulars are sent each week to from 300 to 400 patentees whose addresses they get from the U. S. Patent Office Gazette, and, if only a small number of these are sufficiently gullible to pay them from \$5 to \$20 for alleged advertising, they will make quite a rich thing of it.

It is said that man is a benefactor who makes two blades of grass grow where only one grew before. Certainly there is also beneficence in the extirpation of weeds.

Scientists have unfortunately been, and are still, apt to over rate their actual achievements and to under-rate future possibilities of development; to entertain the erroneous notion that all important laws of Nature are already known; and to think that further progress will consist but in a more extensive grouping of facts governed by the laws. Yet, in spite of this regrettable disposition, it is very evident that, from certain quarters, a fresh impulse has of late been given to scientific research, and that feelers are now stretched on every side in new directions.

### Chinese Patent Laws.

We learn from early publications of Consular Reports, issued by the State Department, that China's recent decision to follow her more active rival, Japan, in coming into line with Western civilization, was shown by the enactment of patent and copyright laws. On July 3, 1898, the Emperor of China, (now deposed) issued a decree, the text of which is quoted from the North China News. The Emperor proceeds to command: "that from henceforth, if there be any subject of ours who should write a useful book on new subjects, or who should invent any new design in machinery, or any useful work of art and science which will be of benefit to the country at large, he shall be honored and rewarded by us in order to serve as an encouragement and exhortation to others of similar genius and talent." Among the rewards mentioned were "official posts, decorations, and fine raiment; these last, it is explained, are, in order to show the masses the persons who have gained honor by their talents and genius." But the reward of granting to authors or inventors the sole right to manufacture and sell their productions for a limited time, suggests a knowledge on the Emperor of China or his advisers of Western patent laws.

Russia appears to be making most headway in the Chinese market. Our consul at Canton. Mr. Edward Bedloe, reports that the American petroleum trade in China is languishing under Dutch and Russian competition, and suggests the fear that the completion of the Siberian Railway will seriously interfere with our trade in China have made tariff rates that greatly favor Russian goods. Consul General Goodnow, from Shanghai states that he finds two obstacles in the way of America doing business with China. The first difficulty is that the American exporters do not take trouble to fill their orders exactly.

There appears to be an American feeling "Oh, anything will do for the Chinese," while in fact, there are no people more particular than the Chinese. Mr. Goodnow insists on the importance of having an agent on the ground in whom the natives have confidence, and who should also know the trade and its demands and cater to it. Then again, English and German firms who are our chief competitors at this port, have arrangements by which claims for damages from faulty packing, etc., are settled promptly through the arbitration of their consul at the place where the goods are delivered, but in similar cases of damaged American goods, the Chinese dealer is forced to stand the loss, rather than go to the expense and delay of a suit in the United States.

### The Remains of Columbus.

It is reported that the Spanish government will remove the alleged remains of Christopher Columbus from their alleged resting place in a church in Havana and ship them to Spain. Well, one more voyage will do the old navigator no harm. But it is probable that the remains in this case will be as spurious as many others preserved in Spanish churches and shrines.

Columbus died, and was buried at Valladolid on May 20, 1506. His bones were afterwards transferred to the Carthusian Monastery at Seville; thirty years later they were removed to a cathedral in San Domingo but this cathedral was destroyed by fire in 1775. San Domingo was ceded to France about twenty years later, and the remains of Columbus, or of some other person buried there, were removed with appropriate pageantry to the cathedral at Havana, where they are now supposed to rest. No one knows at this day where the remains of Columbus actually are. However, the dust that the Spaniards propose to remove—whomsoever's it may be—will meet the requirements of patriotism and sentiment. Doubtless his body is somewhere mouldering in some grave, but his soul goes sailing on.

### Unnecessary Noise.

Every physician and every educated person should wage incessant war against unnecessary noises (1) because it is certain that they increase the sick-rate (by murdering sleep, etc.); (2) because they increase the death-rate, by destroying the vital and restorative powers of the sick; (3) because they dull and brutalize the nervous system of those who can and do learn to withstand their pathogenic influences; (4) because they serve to make the sensitive and cultivated, who are able to do so, separate themselves in their search for quiet from the masses, who must endure, thus serving to intensify the license of the noise-makers by lessening the checks upon their crimes. It may be added that there are persons who actually boast of their indifference to noise. That is, indeed, a thing to be proud of—almost as great a sign of superiority as the indifference of the inhabitants of the slums to the odors of the sewers.  
—*Medical Journal, Phil.*



# TO INVENTORS,

## Patentees and Others Interested in Patents.

The INVENTIVE AGE and Patent Index will hereafter be published by us. We will not say that it will be issued entirely in the interest of inventors, because that would be invention, and we want you to believe us; but it will be issued jointly in our interest and in the interest of inventors, patentees and thinking people everywhere. We would like you to take the Paper. The yearly subscription will be (\$1.00) in postage stamps, or otherwise. We know of no publication that will furnish you as much special information about the progress of invention and give you a complete list of all patents issued for so little money. The Patent Office Gazette costs \$5.00 per year, and our paper at \$1.00 a year will contain the gist of the Gazette with much original and selected matter relating to mechanical and scientific progress, that cannot be found elsewhere. We have long had an ideal of what a paper of this class ought to be, we may never attain it, but we are going to forge in its direction. The Paper which we mail you today will suggest what we are trying to do. If you think we deserve your co-operation, permit us to hear from you. Very respectfully,



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### Nicaragua or Panama.

The Engineering News publishes an important statement in reference to the present status and probable future of the Panama canal by Gen. Henry L. Abbott, of the Engineer Corps of the United States army. Gen. Abbott was a member of a board selected by the new Panama Canal Company to make a fresh survey of the work and an estimate of the cost and time necessary for completing the canal. Associated with him were a number of European engineers, including the chief engineers of the Manchester and the Kiel ship canals. Everything relating to the work at Panama was done *de novo*. Nothing was taken for granted, and no allowance was made for even the simplest parts of the estimates made by the De Lesseps company. The conclusions of Gen.

Abbott are that the canal on the plan of eight lift locks—four on either side of the Culebra summit—is entirely feasible, that the work can be completed for \$100,000,000, and that it can be done in ten years at the furthest, and probably in less time. The estimate of the European engineers is eight years. When completed, the length of the canal will be 43 4-10 miles of inland construction, besides 3 1-10 mile in the bay of Panama, *i. e.*, 46½ miles as compared with 176 miles by the Nicaragua route. Gen. Abbott submits various considerations tending to show that the Panama route presents fewer natural difficulties than the Nicaragua route, and is less exposed to torrential rainfall and to earthquake. He says that the average rainfall at the Isthmus of Panama is 93 inches, while at Nicaragua it is 256

inches, or nearly three times as much. There is no active volcano within 200 miles of the former. "while three lie in close vicinity of the route of the Nicaragua Canal, and one within only 40 miles of its Western locks." In conclusion, Gen. Abbott expresses the opinion that there is only one inter-oceanic canal, that of Panama, that could be judiciously undertaken at the present time. He accordingly recommends that our Government make as thorough an examination of the Panama route and work as has been made of the Nicaragua route before embarking its money in the latter, since two canals are not needed even if two are feasible.—*Nation*.

A paper published in Washington has this month come out with the name, the "Age of Invention," which is a paraphrase of the INVENTIVE AGE. The object of this paper is doubtless to borrow respectability; but it is a palpable evasion of the eighth commandment. We have, by registered letter, warned this paper to discontinue the use of a title that is so plainly an infringement of our rights.

### Inventions Wanted.

We are frequently asked by our readers to send them lists of inventions wanted. We have always refused to do so, for, while we believe invention is a perennial condition, a *lex naturae* which has been, is, and ever will be, we have no wish to join the ranks of fakes and charlatans who send "lists," the sole object of which is to stimulate inventors to pay them fees. If however, an inventor lacks inspiration or suggestion, he may be able to find it in the long list of patents granted in the INVENTIVE AGE. He will there see what hundreds of inventors believe to be wanted.

### What is My Invention Worth?

This question is often asked by those who mistakenly suppose we are experts in commercial and industrial matters. The value of an invention can never be foretold, and a patent attorney should not be asked to answer this question. We know that there are attorneys who glibly inform the inventor that his device is worth many thousands of dollars. Attorneys without conscience, frequently do this when they know that the invention is not even patentable. We do not give opinions in regard to the value of inventions. We confine our opinion to questions we are competent to answer—patentability, scope, novelty, claims, etc. There is no standard for estimating the commercial value of a patent. No two are alike; no two can be handled alike; the market for no two is the same, and every invention is necessarily an experiment and an unknown quantity in the commercial and industrial field. Some things that have come to our office which we thought valuable have turned out to be valueless; while others which appeared to us trivial have proven, through judicious management, of great value to the owners. The value of a patent frequently depends more on judgment and energy

in management than upon the invention itself. This, however, is true of every species of property. Men may make or lose money in patents as well as in farms, factories and gold mines.—From Pamphlet on patents by C. A. Snow & Co.

### Production of Iron in Russia.

The rapid and continued increase in the amount of iron produced in Russia during 1897 occasioned much surprise as well as increased interest among the iron producing countries of Europe. Ten years ago, Russia occupied the seventh place among the iron-producing countries; now she has advanced to the fifth place, her output during 1897 exceeded that of Austria-Hungary and Belgium.

During the year 1897, Russia produced 2,043,000 tons, an increase of 270,000 tons, or 15 per cent, which would have been regarded as unusual even in western Europe. During the past ten years, Russia has tripled her production of iron; it required twelve years for Germany, twenty-three for United States to accomplish the same.

While the quality of iron produced in Russia is inferior, it is largely due to the primitive methods used in its manufacture, the slow development of the iron industry, and the limited number of miles of railway in Russia, the same cause having retarded the development of all her industries are being largely responsible for the famine in 1891-92, as well as the scarcity of food in a number of provinces during the present year, but this is being remedied, and the indications now point to a largely increased activity in the production of iron during the coming year.

### Australian Patents.

A patent granted in New South Wales only protects the holder or holders within the boundaries of the colony. The period for which letters patent remain in force varies from seven to fourteen years, generally the latter period; but a certificate of provisional protection can, however, only be granted for 12 months from date of issue. The number of New South Wales letters patent and certificates of provisional protection issued during the last 10 years was 7,679: of which 913 were granted in 1897. The fees for complete letters patent are £5, and for provisional certificates £2; should the latter be converted into patents within twelve months of issue, the amount is allowed, only £3 additional having to be paid.

### Humanity of a Spanish Surgeon.

During the infantry skirmish following an attack on the landing party from the *Gloucester* at Guanica, Porto Rico, one of our volunteer soldiers outrunning his comrades was far in advance of his command and had nearly reached the Spanish position, when he was overcome by the heat and fell in a semi-conscious state. A Spanish doctor and two hospital-corps men rushed to his aid with a stretcher, administered the necessary restoratives, and had him conveyed at once within the American lines.



# PATENTS

ISSUED OCT., 11, 1898,

And Each Bearing This Date.

A full printed copy of drawings and specification of any Patent in this list will be sent on receipt of 10 cents in postage stamps. Preserve this list for future reference and always send number of the patent ordered.

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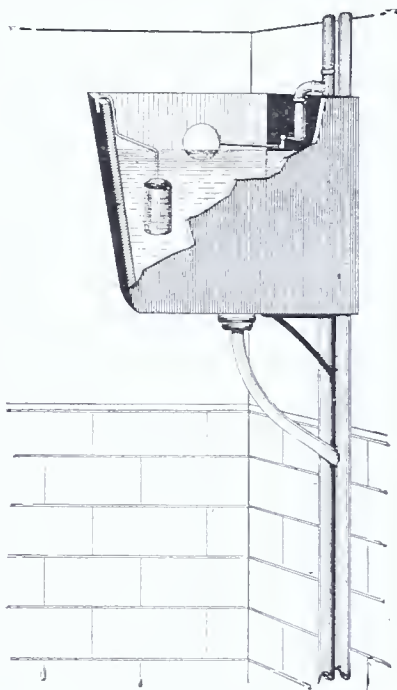
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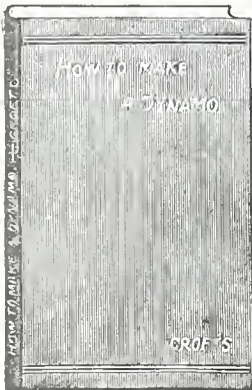
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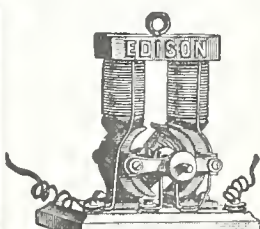
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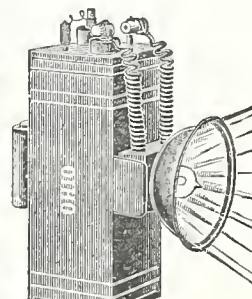
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# The Inventive Age

## AND PATENT INDEX.

Ninth Year. {  
No. 11. }

WASHINGTON, NOVEMBER 15, 1898.

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### No State or County May Tax a Patent Right.

It has again and very recently been affirmed by the U. S. Court that no State law imposing a tax on patent rights can be enforced. In a case recently brought before him by certiorari, Judge Parker of the New York Court of Appeals positively affirmed the doctrines of non-interference of states with patent rights.

We quote below the gist of his decision:

"Patent rights being created under the federal Constitution and laws for a federal purpose, the States are without the right to interfere with them. The right to tax a Federal agency constitutes a right to interfere with, to obstruct, and even to destroy the agency itself, conceding the right of the State to tax at all, then it may tax to the point of destruction. This doctrine is elaborately discussed by Chief Justice Marshall in the U. S. Bank case (*McCulloch vs. Maryland*, 4 Wheaton 316), wherein the court decides that Congress has power to incorporate the bank as a Federal agency, and that having done so, the State cannot tax the bank upon its circulation. The latter proposition is regarded as a necessary conclusion from the former. The federal government having the right to protect it, not only from destruction but from interference from any other government, whether such interference be in the guise of taxation or otherwise, as the power to tax involves the power to destroy, and the power to destroy may render useless the power to create. In the course of his opinion Chief Justice Marshall said:

"If the States may tax one instrument employed by the government in the execution of its powers, they may tax any and every other instrument. They may tax the mail; they may tax the mint; they may tax patent rights."

All the Judges of the Court concurred in the opinion rendered by Justice Parker and the doctrine that patent rights can not be taxed by the State or municipal authorities is again and most positively announced.

### Items from Consular Reports.

The absence of Indian corn as an article of diet among the poorer classes in France is, to a certain extent, replaced by the popular chestnut. Throughout the center of this country, from the Bay of Biscay to Switzerland, there are large plantations, and almost forests, of chestnut trees. These nuts differ very much from the ordinary species indigenous to the

United States; they are broad, large, and resemble the American horse-chestnut or buckeye (*Esculus hippocastanum*), and are extensively eaten by human beings and animals. Great care is taken in harvesting this nut before the severe frosts touch it, as freezing hastens fermentation and makes them worthless.

The poor people, during the fall and winter, often make two meals from chestnuts. The ordinary way of cooking them is to remove the outside shell, blanch them, then a wet cloth is placed in an earthen pot, which is almost filled with raw chestnuts; they are eaten with salt or milk. Hot steamed chestnuts are carried around the city streets in baskets or pails; the majority of the working people, who usually have no fire early in the morning, eat them for their first breakfast, with or without milk. Physicians state that, as an article of food, chestnuts are wholesome, hearty, nutritious, and fattening. These nuts are often used as a vegetable and are exceedingly popular, being found on the table of the well-to-do and wealthy. They are served not only boiled, but roasted, steamed, pureed, and as dressing for poultry and meats.

Chestnuts are made into bread by the mountain peasantry. After the nuts have been blanched, they are dried and ground. From this flour, a sweet, heavy, flat cake is made. It resembles the oaten cakes so popular among Scotch peasants. They are extensively employed for fattening animals, especially hogs. The nuts are boiled without shelling; only small, inferior fruit is thus used.

In good seasons, chestnuts sell as low as 1 cent a pound retail, and wholesale at \$1.50 per 2 cwt.

When these nuts are stored, they are very apt to heat and ferment. Great care must be taken to prevent this; they are placed in cool, airy bins, so that the air can readily pass through the pile and perfect ventilation be obtained.

### Patent Law Revision.

A commission to revise the patent and trade-mark laws of the United States, was appointed by the President in June, 1896, and it has recently sent out a circular letter to the manufacturers and inventors of the country, asking for expressions of their views on the subject. The question of revision has been divided into specific heads, in order that the suggestions which it is intended the circular letter shall elicit, may be properly differentiated. The members of the commission are Hon. A. P. Greely, Assistant Commissioner of Patents, Judge P. S. Grosscup and Mr. Francis Forbes.

### Hand Versus Machinery.

#### Report of Commissioner Wright on Hand and Machine Labor.

The thirteenth annual report of the Commissioner of Labor, just submitted, takes up the subject of hand and machine labor, and is one of the most exhaustive documents upon the subject that has ever been issued.

Data was obtained and has been given in tabulated form of eighty-four different branches in manufactures and also in agriculture and mining, embracing a total of 678 articles, in which hand and machine labor could be contrasted. Among the instances given are the following:

Ruling 100 reams of paper: By hand it took one hand 4,800 hours, and cost \$400, while two hands did the same work on a machine in a total of two hours and forty-five minutes' time, costing only 85 cents.

One hundred pairs of men's fine boots: One hand working 2,225 hours, at a cost of \$566.24, while by machinery it took 296 hours and thirty-eight minutes, with 140 men employed and cost \$74.33 for the labor.

One hundred pairs of women's fine shoes: By hand one workman 1,996 hours, at a cost of \$499.16, and by machinery 140 workmen, at a total of 173 hours' time, and cost \$54.65.

To make 160 dozen of brooms by hand it took nine men a total of 445 hours' time and cost \$73.19, while by machinery the work was done in a total of 295 hours' time, with 105 hands employed, costing \$47.97.

One gross of wire-drawn brushes cost \$16.71 by hand, employing twelve men a total of 300 hours' time; by machinery the same work was done in a total of twenty-seven hours' time, employing twenty-five men, and cost \$3.90.

To fertilize a given space of ground with a wagon and shovel took 25 hours; with a modern drill, it takes but one. Machinery has reduced the time necessary to dig trees to between one eleventh and one thirteenth of the former period. In harvesting grain, the self-binder requires only one eighth of the old time; in planting corn, the new method takes one sixth of the time, and in threshing one thirty-second. In mining coal both the time and cost have been diminished nearly one half during the last six years, and it now takes but 32 workmen where it took 42 in 1891. To print and publish say 10,000 magazines necessitated 5,170 hours and cost \$302.50; it now takes 14 hours and costs \$4.62. The time for making matches has been reduced nine tenths, and cost seven eighths. The expense of lithographing was \$97.80 for 1,000 copies of a certain dimension, and the time was 166 hours; it now costs \$8.75, and takes 30 hours. A thousand axle clips were manufactured for \$233.33, in 666 hours; these figures have been reduced to \$4.27 and 23 hours. The cost of making 500 pounds of butter was \$10.66 and the time occupied was 125 hours; machinery has reduced this to \$1.78 and 12 hours; and in bread making, the cost of 1,000 loaves of one pound each has been cut from \$5.59 to \$1.55, and in time from 28 to 3 hours.

### Death's Deadliest Weapon.

Malaria claims more victims than any other disease. The annual aggregate runs into several millions. A scientific commission has been appointed to investigate the mode of dissemination of malarial poison.

This poison is, in fact, a minute parasite that attaches itself to the blood corpuscles. Seen under a microscope, it resembles at the first a fungus fixed

to the round cell of the corpuscle. The fungus eats its way into the healthy cell, and finally leaves it shriveled and bloodless. Hence the pallor so noticeable in persons that have suffered from this disease; the corpuscles that give give color to the blood have been largely destroyed by the malarial parasite.

The life history of the bacillus after it has entered the human frame is well known to doctors. Much too, is known of its previous history. But a link is missing. How is its transfer from the soil to man accomplished? This the commission is to investigate.

There are many theories. The poison is believed to enter the system both in the air respired by the lungs and in the food and water taken in by the stomach. Water drinking is regarded in many malarious countries as the most frequent form of infection, and it is the practice to boil all water before imbibing it in order to kill the germs. At night over low-lying valleys, a heavy mist will rise, which seems in very truth to be a deadly miasma. This white shroud of material fog has gained for many a land the ill omened appellation of the valley of death. No one who has experienced such an atmosphere, with its sickly smell of rotting vegetation and a ghostly, close-clinging chill which penetrates through the warmest garments, will ever forget it. A London fog is genial weather compared to it.

The latest theory is that malaria is disseminated by mosquitoes. These plaguing insects rise from swamps and low-lying lands, and it is contended that they carry in their bodies a germ of malaria which they deposit in the flesh of the human creature whom they delight to torment. This theory is to be carefully inquired into.

Malaria ravages every land within the tropics, and many in more temperate climates. Hitherto no systematic investigation of the causation of the fever has been conducted. And yet no greater boon could be given to the world than a safeguard against a disease which not only brings death to millions, but where it does not actually kill leaves behind it wasted lives.

A telephone line between Tacoma, Washington, and San Francisco, with branch lines to British Columbia and Mexico, has just been completed, making the longest telephone line in the United States.

A new kind of cloth is being made in Lyons from the down of hens, ducks, and geese. Seven hundred and fifty grains of feathers make more than a square yard of light, waterproof cloth. It is ordinarily cheap.



## DESIGN PATENTS.

In the language of the statute a design patent is granted to any person "who, by his own industry, genius, efforts and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo or bas-relief; any new and original design for the printing of woolen, silk, cotton or other fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast or otherwise placed on or worked into any article of manufacture; or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, or patented or described in any printed publication."

Some inventions from their very nature come within the express language of the statute and can only be protected by design patents. It has generally been the impression that design patents are not granted for mechanical inventions, but this impression is incorrect, as design patents are granted every day upon inventions of a mechanical nature, and further than this, a design patent upon such an invention may be, and often is, very desirable protection.

Design patents, are granted for such mechanical inventions as are articles of manufacture made by hand, machinery or otherwise, and provided that a new, useful and original shape or configuration is given to such article of manufacture.

Design patents are granted for either of three terms, and the applicant must select in advance the term for which he wishes to apply, as this term when once chosen cannot be changed or the patent renewed. The entire cost of securing design patents is as follows:

Patent for three and a half years, whole expense, \$30.00. Patent for seven years, whole expense, \$40.00. Patent for fourteen years, whole expense, \$55.00.

There is no final Government fee in applications for design patents, and as soon as the application is allowed, the patent is sent to issue. The same privileges of manufacturing, selling and using the invention, and of licensing the same right to others, apply to design patents. The owner has also the privilege of marking the article "Patented," with the date; and the courts of the United States are always open for infringement on design patents.—From Pamphlet of C. A. Snow & Co.

## What's In a Name?

The term Anglo-Saxon has come to be used somewhat loosely in current writings in magazines and newspapers and is fast acquiring a significance which originally it did not have. It no longer, indeed, stands in common estimation as distinguishing a race, but is applied to include all English-speaking people.

The English-speaking people are the coming rulers of the earth. They possess already a very considerable part of it, and that the most desirable, but because they speak the Anglo-Saxon tongue, they are not Anglo-Saxons. Even in the home of the

Anglo-Saxon race, the blood which flows in the people is Norman and Keltish in at least equal strain, and that of their sovereigns is more than half Teutonic. Here in America the composite is even more varied. Our population is made up from drafts upon every race in the world. They have come here by the millions, taken on American citizenship and learned to speak English.

It is a great race which is coming into being in the United States, Canada, Australia, and rapidly becoming the most potent influence in Oceania, Asia and Africa. Shall it be called Anglo-Saxon because of the language which it speaks, or what will be its name at the end of the next century?

## Spider-Web Ropes for Balloons.

Spiders must now be counted among the necessary assistants of balloon manufacturers. Many experiments made with spider-web as a substitute for silk have proved the far-reaching possibilities of the new material. The thread of the spider was found invaluable in the production of so-called reticles, crosses, or nets of fine threads placed in the focal plane of telescopes, to determine the exact position of an observed object. Some 10 years ago a French missionary started the systematic rearing of two kinds of spiders for their web. Now *L'Industrie Textile* announces that a spider-web factory is in successful operation at Chalais-Mendon, near Paris, where ropes are made of spider web intended for balloons for the French military aeronautic section. The spiders are arranged in groups of 12 above a reel, upon which the threads are wound. It is by no means easy work for the spiders, for they are not released until they have furnished from 30 to 40 yards of thread each. The web is washed, and thus freed of the outer reddish and sticky cover. Eight of the washed threads are then taken together, and of this rather strong yarn cords are woven which are stronger and much lighter than cords of silk of the same thickness. These web ropes are very much more expensive than silk ones, but it is hoped to reduce their cost somewhat in the future.

## Mont Blanc to Have an Elevator.

M. Issartier, a Marseilles engineer, has for some time been engaged in planning the construction of an elevator to the top of Mont Blanc, the same to have a shaft one and a half miles deep and three and a half miles tunnel to the center of the mountain and the bottom of the shaft. The tunnel would have a rise of 600 feet in 18,964, terminating at a point 7,500 feet above the sea level; the vertical shaft to be 13 by 10 feet, with a depth of 8,300 feet, the excavation to be from below. M. Issartier has devised a "rising chamber," made of strong steel plate and constructed in two stories, in the upper part of this chamber being placed the drilling machinery, driven by compressed air. To avoid lowering the chamber out of the way of blasts, it is proposed to drill on one side first, and then roll the drilling apparatus to the other side, protecting it by means of steel doors provided for the purpose. To

catch the fragments of rock, there is a series of gratings, placed at an angle of forty-five degrees and protected by fascines, an arrangement allowing the escape of the gases from the explosives, while retaining the rock. The debris finding its way to the lower one of these gratings would be pulverized and passed down a twelve-inch tube to the bottom of the shaft, and then be carried out by steam or water propelled pumps. The "chamber" would rest upon and be raised by strong steel racks placed in the four corners of the shaft.

## Coal as a Motive Power in Germany.

Consul Monaghan writes from Chemnitz, of the significance of the large coal output of Germany. Germany is keenly appreciative, he says, of the value of her coal in the development of her industries. Many complaints have been made by the manufacturers against the coal trusts, and it is likely that a movement will be made against them should they prove as the manufacturers claim, they are a menace to national prosperity. In 1897, the production of coal in Germany amounted to 98,850,000 tons. The motive power made in the Empire has increased more than threefold in the past twenty years, and amounts at the present time to 3,421,194 horsepower, equal to the energy of more than 82,000,000 men.

## A Remarkable Invention.

The inventions which Mr. Nikola Tesla occasionally explodes upon the world, are nothing if not sensational. His latest invention, we gather from press reports, is a process for conducting electricity for motor or illuminating purposes, without the medium of a wire. The idea is that rarefied atmospheric stratas can be found at great elevation, interposing but little resistance to electric currents, and that if means of conduction can be secured from earth levels to these natural conductors, the powerful electrical currents can be sent skyward, and thence on horizontal or parabolic planes to powerful receivers at the point where it is desired to utilize the electric current. We understand that Mr. Tesla makes no claim to use the imponderable ether which is said to convey the Hertzian waves in wireless telegraphy. It was Hugo that said "There is nothing so imminent as the impossible," and Hugo himself, was an inventor in his domain.

## Krupp Armor Plate for the New Battleships.

Capt. O'Neill, chief of the Ordnance Bureau of the Navy Department, expresses his belief that the results of the recent tests of Krupp armor plate at Indian Head, insure the adoption of Krupp armor for the three new battleships. The Krupp process, the use of which has been acquired by the Carnegie Steel Co., probably settles the long Congressional controversy over armor plate. Capt. O'Neill says Congress cannot refuse to vote the money for the new plate, the price of which will be about \$525 a ton. As the process is patented, the Government cannot undertake to make the plate. It was proposed to do this with

the Harveyized plate, when Congress determined that it could be made for \$300 and the steel companies refused to turn it out at less than \$400 a ton. In the construction of the battleships Oregon, Iowa and Indiana, an average of 3,000 tons of armor plate was used. The new Krupp plate will increase the cost of the battleships \$500,000 each.

"There will be a decided saving in weight in using the Krupp armor," said Capt. O'Neill, "because a thinner plate of the new armor will give us as good protection as the thicker plate of the old. The heaviest armor plate now used is 16 inches thick. It is probable not more than 12 inches of the new armor will be needed. There will be no saving on the thin armor, because, whatever its toughness, a plate must be of a certain thickness to have any power of resistance; but it will be possible to protect some parts of the ship which are not protected now and still save about 350 tons weight on a battleship. That means a saving of \$140,000 at \$400 a ton; but this will not quite balance the additional cost of the Krupp armor. Congress will not hesitate, however, after our experience in the war, to pay whatever price is necessary to get the very best of everything for our ships."—*The Iron Trade Review*.

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## PATENTS FOR SALE.

ALBERT V. TODD, of Oelwin, Iowa, patent No. 605,589; burglar alarm to be applied to a door or window, and adapted to be operated automatically to explode a cap or cartridge when the door or window is opened or tampered with.

JOSEPH F. JONES, Yellow Springs, Ohio; patent No. 606,555; an alarm to be applied to safes, which will enable the safe to be opened or closed only at a certain time, and which will be sounded should an attempt be made to open the safe surreptitiously.

CHRISTOPHER C. THOMPSON, Grayson, Kentucky; patent No. 598,965; an oiling device for hand saws to be applied to the handle and carried thereby.

FRANK W. GASPER, Wayne, New York; patent No. 607,431; portable wire fence patent for sale, in whole or in part.

THERESA E. O'NEILL, Baltimore, Md.; patent No. 608,266; hanger for ladies' skirts, to engage the hanging loops or tapes of the waist band of the skirt, so as to maintain the shape of the skirt without creasing or wrinkling.

WILBUR E. HARRIMAN, North Chatham, N. H.; patent No. 606,210; ironing table, capable of being folded when not in use and vertically adjustable to suit the operator.

EZRA P. CHAPPELL, Mobile, Alabama; patent No. 599,222; blind or shutter fastener.

HILARY C. JOHNSON, Media, Penna.; patent No. 599,237; a marine velocipede.

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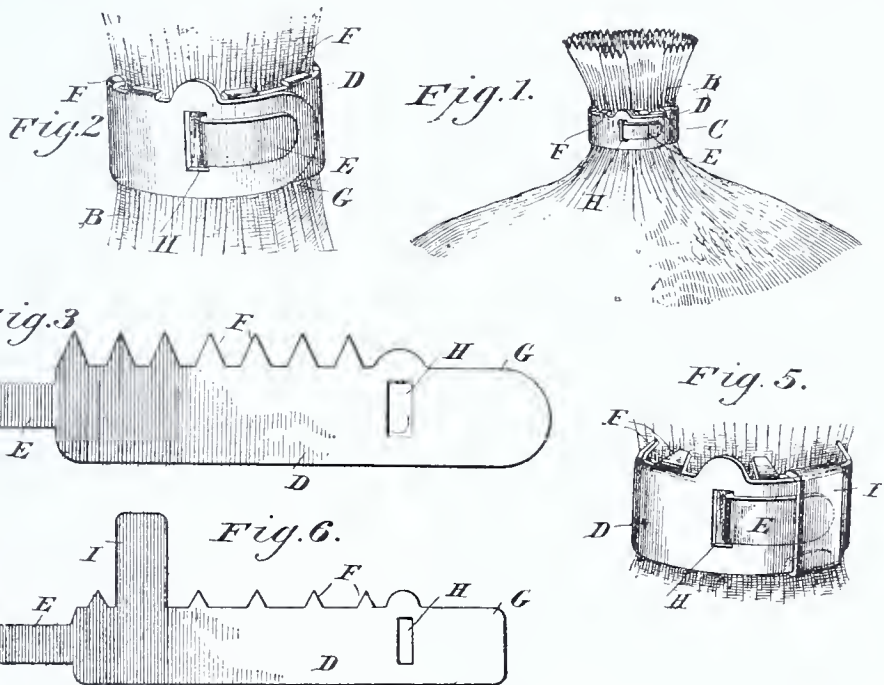
## A RECENT IMPROVEMENT IN BAG TIES.

Although we may not be "bag tiers," we have all witnessed shop keepers tying an ordinary paper bag with a cord or string and have, doubtless, thought that a more reliable and easily applied device should be invented.

The want has been filled, and we here produce one of the simplest things that has been brought to our notice for this purpose. As appears from the illustration, the invention consists of a bag-tie made of a single piece of flexible metal, provided with a projecting tongue at one end, and an eye or slot at the other end, and formed upon its upper edge with teeth adapted to engage the material of the bag, to prevent the displacement of the tie.

Figure 1, shows the invention applied to the neck or closed upper end of a paper bag. Figure 2, illustrates the same position of the tie, the parts being enlarged. Figures 3 and 6, show two different styles of blanks which may be used in constructing the tie. Figure 5, shows the tie provided with a strip to secure the bent tongue and prevent it from becoming disengaged.

In applying the invention, it is bent around the closed upper end of a filled bag, when the tongue E, is passed from the inside outward through the slot H, and bent backward upon the projecting end G, as clearly shown in the draw-



ings. The points of the teeth are bent over so as to engage the bag and prevent the tie from slipping off. The operation is very quickly and easily performed, and the tie being flexible, it is held in place without any additional means.

To remove the tie, it is simply necessary to bend back the tongue, when by grasping the projecting end G, the whole device may be quickly loosened, and removed from the bag.

The simplicity and the cheapness of the article, and the rapidity with which it may be applied to and removed from the bag, will commend it to dealers and the general public. It can be made of any size, and would be of special value for use with cloth bags and the paper sacks for holding salt, flour, etc. By stamping or printing the name of the dealer on the tie at the time it is made, the tie will serve a double purpose, and will furnish a very clever advertising medium.

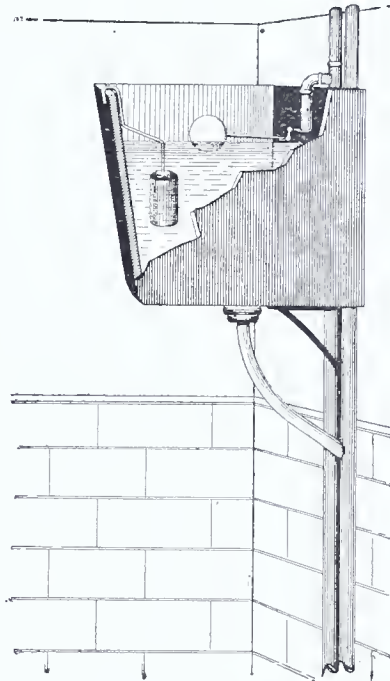
The invention is offered for sale for \$200 cash. As the patentee does not desire to have his name appear in the advertisement, anyone wishing to communicate with the owner will do so by addressing "Owner, Bag Tie, in care of THE INVENTIVE AGE, Washington, D. C." All letters will be promptly forwarded by the editors of the paper to the patentee.

## Marriage of the Unfit.

Theft and murder are considered the blackest of crimes, but neither the law nor the church has raised its voice against the marriage of the unfit, for neither has realized that worse than theft and well nigh as bad as murder is the bringing into the world, through disregard of parental fitness, of individuals full of disease tendencies. This has been left to our own profession, and we shall be unworthy of its traditions if we do not, each of us in his own particular sphere, strive to

bring nearer the day when, not in a heritage of woe but of blessing, the deeds of the fathers shall be visited upon the children unto the third and fourth generation.—Dr. Harry Campbell, *London Lancet*, September 10th.

The United States Ambassador at St. Petersburg calls attention to the fact that 70 per cent., nearly, of the patents granted in Russia are to aliens, although Russian subjects can obtain patents free by applying *in forma pauperia*.



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WASHINGTON, NOVEMBER 15, 1898.

This is emphatically the Inventive Age. No previous known era of the world can compare with it. Within the memory of men still living, nearly all the physical and scientific progress with which and by which we live and move had its birth. No other epoch will compare with the one hundred years of this inventive age.

The economical use of fire was doubtless the most remarkable discovery of our prehistoric ancestors, but it is only in the last one hundred years that fire has been used on a great scale for motor and locomotor purposes, for extensive manufacture and for illumination by gas and electricity.

Two thousand years ago, Sophocles in *Antigone*, wrote of man's triumphs over nature in an exultant strain, and his climax was that man had caught the fierce bull and harnessed him to the plow. What would he think of the iron stallions that draw trains from New York to San Francisco, or of the steam-lunged, steel-finned leviathans that plough the Atlantic, or the talking cables under ocean depths!

Can anyone with a knowledge of past and present conditions doubt that the progress of the future will be as remarkable as that of the past? Look at the immense vantage for progress in the twentieth century. Every scientist, every investigator, every inventor lives, not as did his intellectual forebears in cloisters, or in penury menaced by doubts and fears, but as it were, in a protected glass house, and in close sympathetic helpful communication with his brethren, whether they are in the laboratories of Chicago or St. Petersburg, Paris or New York.

Suppose the Roentgen ray had been discovered two hundred years ago, would it in one month have been heralded to the remotest hamlets of Christendom, utilized and improved, its wonderful revelation accessible to the merely curious as a ten cent show? More probably the discoverer would have been burned as a wizard.

The glass house instead of the cloister, patent and printing protection instead of the stake and the rack, are such encouragement to daring pioneering thought, that we have everything to hope from its free exploitation;

and it is not extravagant to expect that the steam, electricity, the telephone, and other monuments of progress will be distanced by the discoveries of the next hundred years.

The great laboratories of the world are splendidly endowed. Trained, skilled specialists, keenly alive to the possibilities of the future, are in touch all over the world. "He who runs may read," and he who reads most will run best. Who will prophesy that their co-operative output will be less than that of the comparatively isolated efforts of the Franklins, the Fultons, the Howes, and the Morses of the closing century?

### Why Many Newspapers Fail.

In a recent lecture, entitled "The Making of a newspaper," Rev. Byron H. Stauffer, of Buffalo, N. Y., said:

"The true newspaper always has this dormant mind behind it—the individuality of the leading spirit of the organization must be stamped on every issue. The reader must feel the breath of his argument and the heat of his enthusiasm; whatever it is that man stands for, he must stand for. Be he on one side or another, the reader feels that the paper is giving its life for the cause that this mind is espousing. No sheet which has not this mind behind it is a newspaper. Stock companies may be formed with millions of capital; talent may be engaged to edit and to circulate; thousands may be spent in telegraphic or home news, but unless one man steps out and puts his hand on the throttle, controlling the direction, regulating the speed, and ordering stops and starts, the engine will run wild and the train will be ditched. Two hands cannot control the throttle; they will throttle the control. This is why so many newspaper enterprises, begun auspiciously from a monetary standpoint, have failed. Their board of directors might have resolved and voted to the crack o' doom; what the reader wanted was one mind. No paper can run for revenue only. Most great newspaper are revenue producers, but not because they merely try to be."

### Imports into Germany of American Iron.

It is evident that the increasing importation of American iron, steel, and machinery into Germany is causing quite as much astonishment in iron circles in the Fatherland as it is in the United Kingdom. German papers point out that up to 1893 the Americans did not manufacture enough for their own requirements, and the imports into the United States were, in 1893, nearly five million dollars more than the exports. In 1894, however, the tide is turned; the exports from the United States exceeding the imports by over eight million dollars. Since then the excess of exports has grown rapidly. Three years ago it would have been incredible to suppose that the United States would export raw iron and steel to Germany. But in 1895 raw iron, steel, and machinery were sent to Germany to the value of nearly 4½ millions of marks, and in 1897 these transactions increased to at least three times that sum. It is par-

ticularly in regard to machinery that these increasing importations are regarded as important. In the first seven months of the present year 12,570 tons of machinery (chiefly agricultural) have been imported into Germany from the United States. German manufacturers are being strongly urged by iron trade journals to combine solidly against this increased importation.—*Trade Journal Review*.

### Real Expansion.

It is stated that Assistant Postmaster General John A. Merritt will, in his annual report, recommend the reduction of ocean postage between the United States and Great Britain to 2 cents on letters. At present, the postage is five cents. Great Britain, it is understood, is willing to meet the United States in this reduction, which, if it goes into effect, will mean that the two countries so closely allied in language, laws, literature, and commerce, can communicate by letter at the home rate. We will then be able to send a letter to any one of the four hundred million of the British Empire at the same rate that we send to the nearest or remotest post office in the United States.

### Opposed to Unity.

The Anglo-American reproachment fraught with so much promise for civilization and for peace, seems to excite the ire of the Irish. Last week, a protesting meeting was held in Costello's Hall, over Costello's saloon, at which the most prominent personage was the professor of Gaelic (don't print garlic) at the Catholic University. It would be a great pity if the Gaelic language and literature should perish from the face of the earth! The pulpit of St. Patrick's Catholic church has also been thundering against Anglo-American unity, very much as the archbishops in Cuba and at Manila, thundered against the "social outcast" Americans a few weeks ago.

### A Cuban Military Railway.

Secretary Alger will, it is reported, recommend to Congress that the existing railroad system in Cuba, be extended so as to form a line running directly from Cape Maysi, at the east end of the island, to Cape Antonio, at the western end, the work to be undertaken by our Government. This recommendation is the result of investigations of our commissioners now in Cuba, who find such an extension of railroad facilities to be a military necessity.

### Machine-Made Cutlery.

Table-knives are now being turned out at Sheffield by an entirely new description of machinery. The work is exciting much interest in the town, for it promises to effect a remarkable improvement in the production of cutlery. A round bar of steel is placed in the machine, and by means of hydraulic pressure a perfect knife is formed—blade, bolster, and handle. The "fash," or fin, is taken off, and it is ground and polished by the same

machinery. It is stated that one machine is capable of producing 5,000 of these all-steel knives per day, at a comparatively small cost for manufacture. The machinery is capable of dealing with any kind of cutlery or tools. A company has been formed for working the patent, and a Sheffield firm has practically secured local rights.—*Trade Journal*.

### The Earth of Cosmic Origin.

Recent researches have gone far, it is thought, to render possible the assertion of Nordenskjöld and others that a large portion of the earth's constituents may be of cosmic origin—that, in other words, in the course of ages the distant stars and other heavenly bodies may have contributed of their substance to thicken the crust of our world. In evidence of this is cited the fact that, at various times and in various places, there has been collected from the snow a black powder containing metallic iron, and in some instances cobalt and nickel; while on the inland ice which covers Greenland, a peculiar mineral powder, known as kryokonite, mixed with grains of metallic iron, has been detected. This dust consists of small, angular, double refracting crystal fragments, without any mixture of particles of glass, dust that is commonly ejected from volcanoes. It is from these and similar data that Nordenskjöld ventures on the assertion that not improbably if this dust falls in an equal amount all over the globe—and though the snow enables it to be detected more easily than on earth, there is no reason for supposing that it does not—some thing like half a million tons drop from the celestial spaces in the course of a year. The shooting stars must, it is supposed, discharge an immense quantity of luminous particles.

### Rats as a Hair Tonic.

The old Chinese medical practice still lives. A Chinaman advocates the use of rats, thus: "What the carrot is to a horse's coat a rat is to the human hair. Neither fact can be explained, but every horseman knows that a regimen of carrots will make his stud as smooth and lustrous as velvet, and the Chinese, especially the women, know that rats used as food stop the falling out of hair and make the locks soft, silky, and beautiful. I have seen it tried many times."—*Med. Record*.

### "Health Shaker."

A San Francisco man is said to have recently invented what is termed a "health shaker." The machine consists of a platform on which the subject stands and which is then rapidly made to oscillate by means of an electric motor. The motion is said to be excellent for the liver, and the inventor claims that ten minutes of such shaking is better than half an hour's work in the gymnasium. A course of such shaking might advantageously be taken as a preliminary to a sea voyage.

A new handle bar is being made with a metallic grip, and a wheel generator mounted on one of the wheels.



# PATENTS

ISSUED OCT. 18, 1898,  
And Each Bearing That Date.

A full printed copy of drawings and specification of any Patent in this list will be sent on receipt of 10 cents in postage stamps. Preserve this list for future reference and always send number of the patent ordered.

C. A. SNOW & Co., Patent Lawyers,  
WASHINGTON, D. C.

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First.--Send a model or drawing of your invention with a plain brief description of same to a Registered Patent Agent in Washington, D. C. There are good agents in all the large cities, but Washington agents have the advantages of better facilities for investigation and searches because they are near the U. S. Patent Office where all the models and copies of Patents can be examined.

If the agent reports your invention patentable remit the amount he calls for, provided it is not exorbitant. It should not be more than from \$20 to \$30, the former sum being the first remittance for a simple invention, \$30 being the amount usually required in a difficult or complicated invention.

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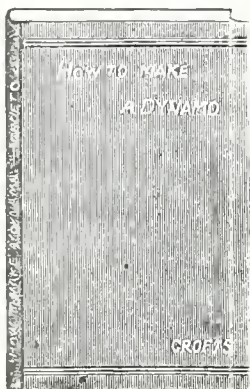
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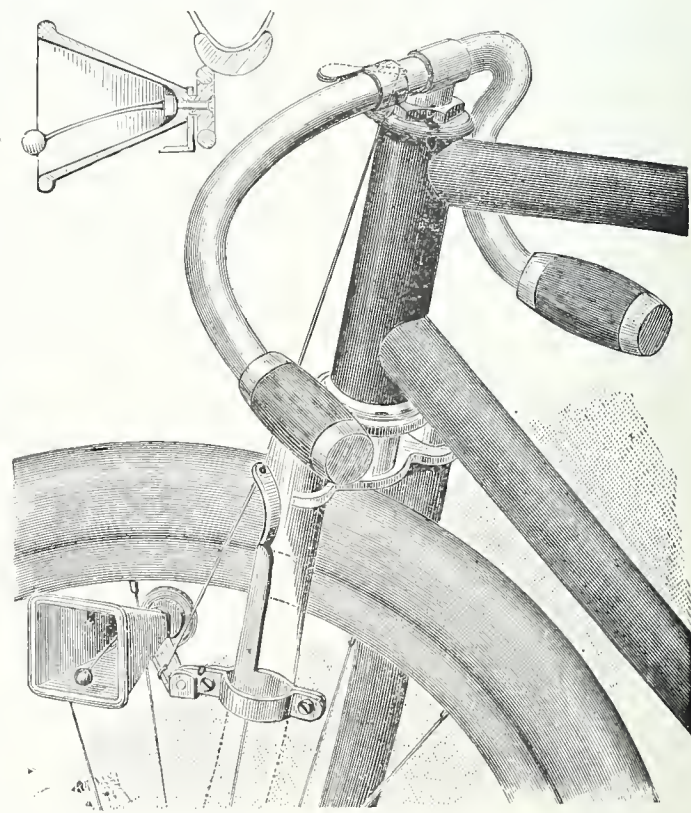
## VALUABLE PATENT FOR SALE.

Patent No. 609,983. Issued Aug. 30, 1898.

A valuable Patent for sale, or license granted under same for working the invention. The patent broadly covers the unique alarm bicycle bell shown in the cut, which bell is entirely gearless, positive in action and gives a great volume of sound. The bell can be made at an exceedingly low figure, and sold for less than any similar bell on the market.

The owners of the patent are engaged in other business, and cannot handle the invention, and therefore desire to sell the patent outright, or grant licenses or territorial privileges thereunder. Address communications:

Owner Bicycle Bell, care Inventive Age, Washington, D. C.



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# The Inventive Age

## AND PATENT INDEX.

Ninth Year. }  
No. 12. }

WASHINGTON, DECEMBER 15, 1898.

Single Copies 5 Cents.  
Fifty Cents a Year.

### Patent Sale Agencies.

WE propose to continue our attacks upon schemes to defraud inventors and patentees. There is no reason why any reader of the INVENTIVE AGE shall be the dupe of patent sharks and swindling agencies. We propose to pillory their practices. If our readers are caught, it must be with their eyes open.

Any agency that pretends to sell patents for a commission and gets money for alleged advertising makes all its profit from the money that gullible inventors and patentees pay them in advance. They make no money from commissions because they never sell patents. In holding out the idea that they will sell, they are dishonest and fraudulent. A sure way of exposing them is to offer them, instead of the money they want in advance, double or five times the commission that they pretend to be after. They will decline the big commission proposition and by doing so will admit that they do not expect to sell. Why will inventors and patentees pay strangers for empty promises?

### England Our Largest Buyer.

The fact that British imports into the United States have fallen off greatly in the past year while American exports to Great Britain have greatly increased has been announced from time to time during the year, but the full year's figures, just presented by the Treasury Bureau of Statistics, bring to the surface some interesting details not heretofore published. These show that while the exports from the United States to the United Kingdom have increased 12 per cent, the imports from the United Kingdom have fallen off 35 per cent. The exports from the United States to the United Kingdom during the past year were in round numbers five times as much as the imports from the United Kingdom, the figures of the Bureau of Statistics being: Imports from the United Kingdom, \$109,138,365. Exports to the United Kingdom \$540,860,152.

As the manufacturer of the United States penetrates the markets of the world, it becomes evident that his most formidable rivals are England and Germany. Our great disadvantage is that our consuls, and commercial travelers are not linguists. The Englishman and especially the German are more polyglot than the American is. We must give more attention to modern and less to ancient languages in our schools and colleges. We must give up that provincial egotistic nonsense that Yankee wit is more than equal to the special preparation with which our better equipped

competitors go forth to commercial conquest. No man should be appointed consul to any foreign country unless he is familiar with the language of that country.

The United States is no longer a blank on the map, and Americans are coming well to the front, as they are discovering more and more what an immense and undeveloped field the land of the Czar offers to Western enterprise. American engineers are everywhere. Bates' dredges are to deepen the Volga, the Dnieper and the Don. American rails are being largely used in the building of the Siberian railroads, representatives of Worthington are laying down 200 miles 8-inch piping in the trans-Caspian region, and the pumps used by the Rothschild combination will be American. Prince Khilkoff, Minister of Ways and Communication, served some time in an American railway shop, and his chief ambition is to repeat in Siberia the story of the last fifty years of the west of the Mississippi. The American element in the country is a little yeast leavening the Russian mass with American ideas.—*Ex.*

### Impelling Causes of Our Foreign Trade.

The rapid development of American foreign trade, especially in iron, steel and machinery, is the most astonishing and cheering manifestation of virility ever given by our manufacturing industries. For more than a third of a century the national policy has been shaped in the apprehension of disaster, appalling and irretrievable, to our "infant industries" if the barrier of a war tariff were removed from before the pauper labor products of the Old World. For several years past, at least, this has been a clearly mistaken view, since it has overrated the strength of foreign competition and ignored the incomparable efficiency of American labor and of our world-beating natural resources. Our fears and misgivings on this score have certainly been idle ones in recent years; but the policy of protection has nevertheless served a useful purpose, in that it has worked to a fuller development of manufacturing enterprise, and thereby hastened the day of America's entrance into foreign markets in a way to do credit to her resources. It has practically created and securely established the great industry of tin plate manufacture in a space of time which may be reckoned by months rather than by years.

Still, something more than mere productive facilities had been needed to induce our manufacturers to go abroad for trade. That something came as one of the bitter, and yet blessed,

results of the panic of '93. The depression of business in this country following that great financial convulsion compelled them to look abroad for orders or shut up shop. They had to break away from all the teachings of nursery lore anent the terrible foreigner, and advance more than half way to meet and cope with him for supremacy. They did it, and now they are glad of it.

There is now no subject of commercial bearing in which the American people are so deeply interested as that of foreign trade. Recognizing this fact, the Age of Steel will issue on January 7th a magnificent edition devoted to the American export trade in machinery, iron and steel, and hardware, with especial reference to the exportation of machine tools, steam and electrical equipment, pig iron, steel rails and other prominent items in the outward movement.—*Age of Steel.*

### Paper Teeth.

Dentists in Germany, are using false teeth made of paper instead of porcelain or mineral composition. These paper teeth are said to be very satisfactory, as they do not break or chip, are not sensitive to heat or cold, or to the action of the moisture of the mouth and are very cheap.

### A Canada Patent for \$30.

It is not generally known that Canada stands fourth on the list in our commerce with the world. Our traffic with Canada is greater than that with all South America, Central America, Mexico, and Cuba combined, and there are only three other countries on this planet with which we have a more extensive trade than we have with our near Northern neighbor.

It is also a fact that Canadian Patent Laws have been enacted with special reference to the accommodation of United States inventors, for more citizens of the United States procure patents in Canada than do the Canadians themselves. Canada is one of the few countries in which a good and valid patent can be procured after the issue of a United States patent.

The total term of the Canadian patent is eighteen years, and the cost of patent, including Government and attorney's fees is \$70, but a patent may be taken out for six years at a total cost of \$30, and, at the end of this six years' term, it may be extended for the remaining twelve years by paying a government fee of \$40. There are no taxes for the Canadian patent, and the owner of the Canadian patent has exclusive monopoly, both in the manufacture and sale of the invention, in all the British possessions of North America, including Prince Edwards Island.

It is, of course, not advisable to patent every invention in Canada. Machinery for the cultivation of cotton would, evidently be out of place in the Dominion of Canada, as would any other invention that is adapted only to tropical and sub-tropical uses; but, considering our proximity to our good neighbor, the fact that we are the same in language and institutions, and that even closer commercial relations than have heretofore existed are in prospect, the desirability of protection in the Dominion of Canada will be appreciated by United States inventors.

The inventor only can apply for a Canadian patent, and any deed that he may have made of the U. S. Patent will in no way impair his protection or his right in Canada. The inventor may sell his Canadian patent in whole or in part, without regard to any sale he may have made in the United States, and the purchaser's title will be perfect when the deed of transfer is recorded in the Canada patent office.

### British Expansion.

It is but justice to the British to say that their refusal to evacuate Egypt is probably due to their wonderful success. Their administration has transformed Egypt. It has restored agriculture, spread security and order such as have not been seen in Egypt since the days of the Pharaohs. It has created an Egyptian army which far outdoes that with which Mehemet Ali beat the Turks; it has made the Egyptian debt a paying investment; and as it happens, no country profits by this so much as France, as the French are the principal Egyptian creditors. As the British withdrawal would probably be followed by the old disorder, the British determination to remain is not to be wondered at. Lord Salisbury's aim has, apparently, been to continue the occupation while provoking France as little as possible, and for this reason, in spite of the Jingo mood of the British public, he refused to declare a protectorate last week at the Lord Mayor's banquet. After what has happened, England probably never will evacuate except as the result of a crushing defeat in war—something which will hardly occur in our time. England is, in the matter of staying power, very like the United States—in that only an enemy which can land and ravage the country will ever bring her to her knees.—*Nation.*

It is a curious fact that some inventors who are so prudent that they will not pay a neighbor until he has satisfactorily completed his work, will, nevertheless pay money in advance to agencies, claiming to sell patents on commission. As a fact, they never "sell" anything except the inventor.



**A Typical Letter.**

HUNTSDALE, PA., Nov. 11, 1898.

MESSRS. C. A. SNOW &amp; Co.,

GENTLEMEN:—I wish to ask if, in your opinion, a good nut lock is desired in the market, and if such a device would be likely to be adopted if practicable and inexpensive.

I have no money to throw away on patents, but if I was reasonably certain of success, I would try and get the money to have this one patented.

Yours truly, J. B. —

The above is a type of letter we receive every day. Below we give the substance of our reply to letters of this class.

NOVEMBER 14, 1898.

MR. J. B. —

DEAR SIR:—We have yours of the 11th inst., asking us if in our opinion, a nut lock is desired in the market and if such a device would be likely to be adopted, etc.

We do not answer such question as you have asked. We never encourage or discourage an application for patent. If you want a patent, we are here to serve you with skill and judgment in procuring it. But the question you have asked us, is a purely business one, and you are quite as competent to judge of trade requirements as we are. We do not encourage our correspondents, because we do not wish to be, or to appear, over anxious to make a fee, and we do not discourage them for fear we may advise them against their profit. In short, we refuse to assume the responsibility of advising you in a question that relates to business simply, and has no relation to patentability, infringement, scope, validity of claims, etc., etc., the only questions in which we claim to give competent advice or service.

If you will send us a model or drawing of your nut lock, we will make a free examination and advise you whether we think it patentable or not.

We remain, yours truly,

C. A. SNOW & Co.,  
Washington, D. C.**Another Letter.**

SAUGERTIES, N. Y., Nov. 28, 1898.

MESSRS. C. A. SNOW &amp; Co.,

Washington, D. C.

DEAR SIR:—I see a word of warning and advice in your paper, THE INVENTIVE AGE.

Now, I have received a Patent on a Match Box, No. 607,537, and am receiving daily letters from firms offering to sell it for me, and I at last, put it in the hands of a firm by the name of Chappelle Bros., Business Brokers, No. 80 Liberty Street, New York City, and gave them a copy of the Patent, also a wooden model of same, and went to New York and saw them personally, and made arrangements with them, and paid them some money to have some circulars printed to send out, and they have had no circulars printed, which I can prove by a letter from them. They stated that they had written letters to parties instead, and that is the only letter I have received from them. Have written several since, and they have all come back, marked, "Could not be found," "Removed," "Address unknown," and that is over thirty days ago. I think they are trying to swindle me out of it. Now I am poor and would like to sell it and get a little money out of it, and not be swindled out of all. I didn't give them any authority to sign a Bill of Sale for me. Please let me know what can be done in the matter, and who could sell it for me, and oblige,

Yours truly, J. H. B. —

Our answer to the above—

MR. J. H. B. —

DEAR SIR:—Yours of the 28th inst. received. You are evidently a victim of one of the many swindling patent sale agencies. There are many of them, and they are, in our opinion, all

fraudulent. We know of not a single exception. We are sorry that you have been caught, but we hope that you will profit by your experience and do your utmost to warn others. You, of course, will not be able to find these people, but we can assure you that they have done you all the harm that they can. In other words, have taken your money and have caused you the useless expense of a trip to New York. You need not be afraid of their selling your patent. They cannot do it without your signature, but if they had a thousand signatures they would not attempt to do it. They have gotten all they want of you, —your money,—and, as your letter indicates, you are not able to find them. Yours truly,

C. A. SNOW &amp; Co.

We reprint below the word of warning and advice to which J. H. B. — refers.

**A WORD OF WARNING AND ADVICE.**

So many of our clients have been swindled by Patent Sale Agencies, that we have decided to send this circular warning inexperienced patentees against their schemes. Old patentees, those who have procured their second or twenty-second patent, do not need warning. Many of them have been taught in the "school of experience" and this circular is not for them. It is particularly for the patentee who has had his name published for the first time in the Patent Office Gazette, and is receiving tempting proposition from Patent sale agencies who look upon a fresh inventor as their prey.

Believe us: none of these people can sell your patent or do you the least good. You will throw away any money you may send them. Do not, as you abhor being duped, waste even so much as a postage stamp with them.

The Sale Agencies NEVER SELL PATENTS, they never even try to sell them. They offer to sell your patent for so much cash, and a commission. Now, if you will not heed our warning and consign their circular to the waste basket, write them and offer instead of the cash in advance, 80 per cent commission, and see how quick they will leave you. By this you will see the "Agency" has no thought of selling your patent. It would rather have \$10 or \$20 than a commission of 90 or 99 per cent contingent on a sale. In other words, they do not value their prospective commission on your patent at anything; they want only the \$10 or \$20 which they hope you may be foolish enough to pay them. We invite correspondence with all patentees who have had experience with these "Sale Agencies" and Patent Swindlers of all classes. We have called the attention of the Government Detectives to a number of them, and we want all the evidence we can obtain. By sending us evidence of their effort or accomplishment to swindle, you will be doing a public service.

Yours truly, C. A. SNOW &amp; Co.

**Sea Water to London.**

The use of sea water for the flushing of sewers, the quenching of conflagrations and for general bathing purposes, is among the projects taxing the brain of the London City Council. It has been used for such purposes in a sea coast town at a large saving of expense, and with no possibility of exhausting the ocean reservoir. The city of London last summer was occa-

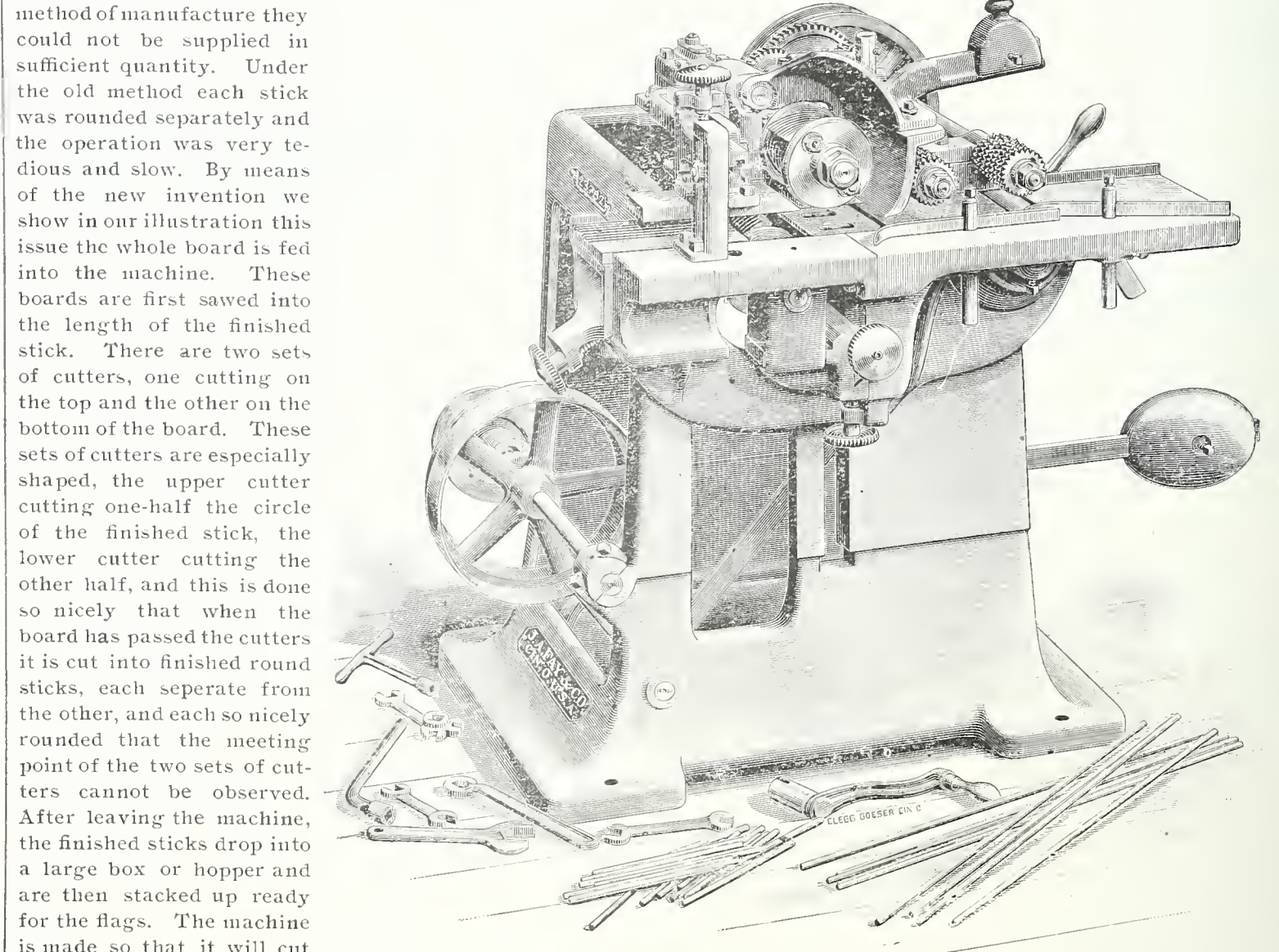
sionally on the verge of a water famine. This in a city of nearly five millions would have been a terrible calamity, involving hazards from fire and human suffering on a formidable scale. Pure water obtained from long distances under such circumstances is necessarily costly and limited. Much of it could be economically saved if the sea could be tapped for water to be used for such purposes as named. There is no limit to the supply, and its free use for sanitary purposes would clean out some Augean stables and indirectly promote health conditions. The project is certainly deserving of municipal attention.—*Age of Steel.*

The French Electrician reports that the town of Blankenberghe is now supplied with water in which all germs have been killed by means of ozone, generated by an electric current. The same principle will soon be applied to the dangerous Seine water at St. Maure, Paris.

Inventors should read "The Inventive Age." Its advice will enable them to save money. Fifty Cents a Year.

**HOW FLAG STICKS ARE MADE.**

Many advances have recently been made in the construction of wood working machinery, which have been directed to the various fields covered by this industry, but none have been so radical and at the same time unique as the machine just invented for the quantitative manufacture of flag sticks. This is a direct result of the great patriotic movement that has swept the country and placed the American Flag in the hands of every school child, and the almost universal display of the flag on every public occasion. The little sticks to which the flags are attached are consequently in great demand, and by the old method of manufacture they could not be supplied in sufficient quantity. Under the old method each stick was rounded separately and the operation was very tedious and slow. By means of the new invention we show in our illustration this issue the whole board is fed into the machine. These boards are first sawed into the length of the finished stick. There are two sets of cutters, one cutting on the top and the other on the bottom of the board. These sets of cutters are especially shaped, the upper cutter cutting one-half the circle of the finished stick, the lower cutter cutting the other half, and this is done so nicely that when the board has passed the cutters it is cut into finished round sticks, each separate from the other, and each so nicely rounded that the meeting point of the two sets of cutters cannot be observed. After leaving the machine, the finished sticks drop into a large box or hopper and are then stacked up ready for the flags. The machine is made so that it will cut any size of stick from the very smallest up to any diameter desired by simply changing the cutters on the cutting mandrels. The machine is so arranged that these cutters can be removed from the mandrels very readily and new cutters can be put in place in about a minute's time. The upper and lower cutters are placed in an almost vertical plane so that they will cut the sticks at almost the same time, and after the sticks leave the cutters they are fed into circular grooves before they leave the machine so that each separate stick is held firmly in place and a smooth cut insured. The machine cuts the sticks so smoothly and uniformly that sanding is not necessary. This machine can also be used for cutting all kinds of circular sticks for other uses, such as skewers, dowels, etc.



Messrs. J. A. Fay & Co., cor. Central Avenue and West Front Street, Cincinnati, Ohio, have had a special corps of expert mechanics and draughtsmen at work for the past year, designing and perfecting New and Improved Wood Working Machines, and this is one of those they have just brought out.



## PATENTS FOR SALE.

ALBERT V. TODD, of Oelwin, Iowa, patent No. 605,589; burglar alarm to be applied to a door or window, and adapted to be operated automatically to explode a cap or cartridge when the door or window is opened or tampered with.

JOSEPH F. JONES, Yellow Springs, Ohio; patent No. 606,555; an alarm to be applied to safes, which will enable the safe to be opened or closed only at a certain time, and which will be sounded should an attempt be made to open the safe surreptitiously.

CHRISTOPHER C. THOMPSON, Grayson, Kentucky; patent No. 598,965; an oiling device for hand saws to be applied to the handle and carried thereby.

WILBUR E. HARRIMAN, North Chatham, N. H.; patent No. 606,210; ironing table, capable of being folded when not in use and vertically adjustable to suit the operator.

FRANK W. GASPER, Wayne, New York; patent No. 607,431; portable wire fence patent for sale, in whole or in part.

EZRA P. CHAPPELL, Mobile, Alabama; patent No. 599,222; blind or shutter fastener.

THERESA E. O'NEILL, Baltimore, Md.; patent No. 608,266; hanger for ladies' skirts, to engage the hanging loops or tapes of the waist band of the skirt, so as to maintain the shape of the skirt without creasing or wrinkling.

HILARY C. JOHNSON, Media, Penna.; patent No. 599,237; a marine velocipede.

W. E. MICHAEL, Enterprise, Harrison Co., W. Va.; recent Canadian Patent No. 59,477; an Improved Safety Pin, practicable, simple and cheap; a fortune in it. Will sell entire patent cheap.

MRS. JOHN N. SCHMELZER, Avoca, Wisconsin; patent 389,981 Band Cutter and Feeder is offered by the widow of the inventor for the very small price of \$400.

WANTED TO BUY.—Patents that are good territory-sellers; price must be low. Address: John N. Neal, Cold Water, Mich.

WANTED.—Patented inventions in the line of hardware specialties, or articles in every-day use. Must be simple and easily manufactured. Address, Animal Trap Co., Abingdon, Illinois.

If you want to buy a patent, or sell one, advertise in THE INVENTIVE AGE.

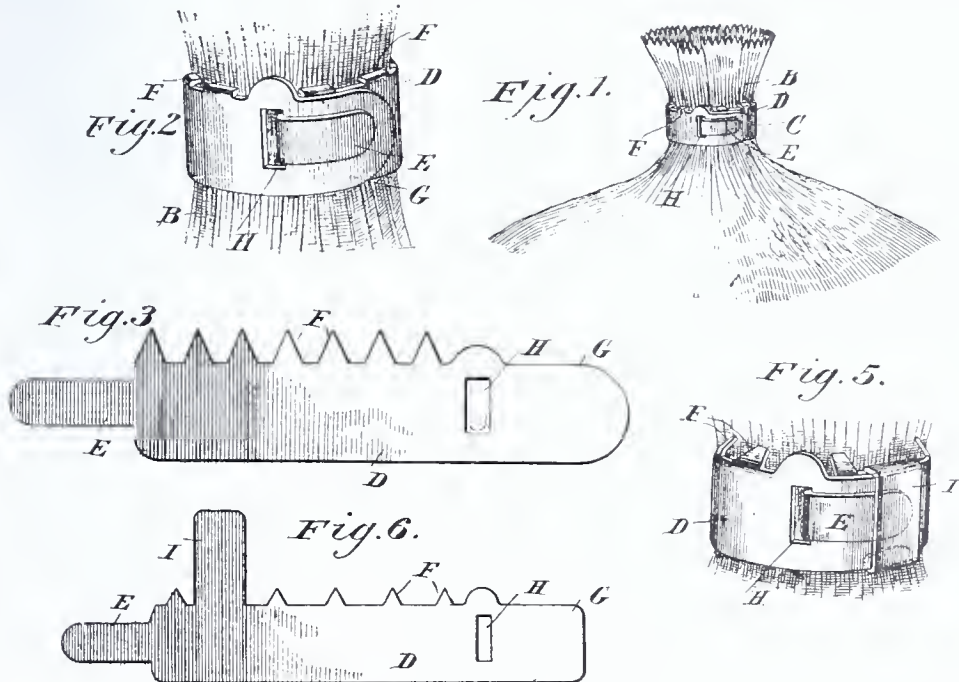
## A GOOD PATENT OFFERED FOR \$200.

Although we may not be "bag tiers," we have all witnessed shop keepers tying an ordinary paper bag with a cord or string and have, doubtless, thought that a more reliable and easily applied device should be invented.

The want has been filled, and we here produce one of the simplest things that has been brought to our notice for this purpose. As appears from the illustration, the invention consists of a bag-tie made of a single piece of flexible metal, provided with a projecting tongue at one end, and an eye or slot at the other end, and formed upon its upper edge with teeth adapted to engage the material of the bag, to prevent the displacement of the tie.

Figure 1, shows the invention applied to the neck or closed upper end of a paper bag. Figure 2, illustrates the same position of the tie, the parts being enlarged. Figures 3 and 6, show two different styles of blanks which may be used in constructing the tie. Figure 5, shows the tie provided with a strip to secure the bent tongue and prevent it from becoming disengaged.

In applying the invention, it is bent around the closed upper end of a filled bag, when the tongue E, is passed from the inside outward through the slot H, and bent backward upon the projecting end G, as clearly shown in the drawings.

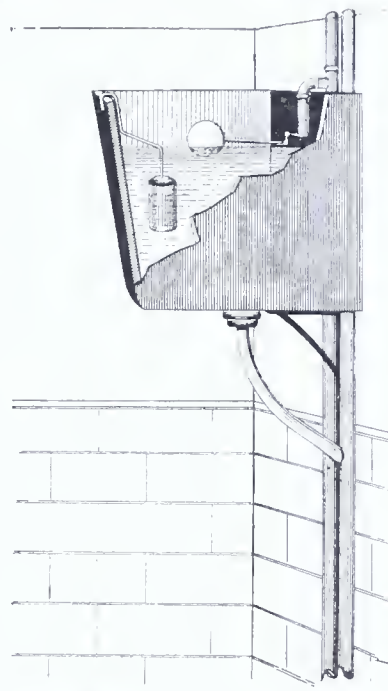


The points of the teeth are bent over so as to engage the bag and prevent the tie from slipping off. The operation is very quickly and easily performed, and the tie being flexible, it is held in place without any additional means.

To remove the tie, it is simply necessary to bend back the tongue, when by grasping the projecting end G, the whole device may be quickly loosened, and removed from the bag.

The simplicity and the cheapness of the article, and the rapidity with which it may be applied to and removed from the bag, will commend it to dealers and the general public. It can be made of any size, and would be of special value for use with cloth bags and the paper sacks for holding salt, flour, etc. By stamping or printing the name of the dealer on the tie at the time it is made, the tie will serve a double purpose, and will furnish a very clever advertising medium.

The invention is offered for sale for \$200 cash. As the patentee does not desire to have his name appear in the advertisement, anyone wishing to communicate with the owner will do so by addressing "Owner, Bag Tie, in care of THE INVENTIVE AGE, Washington, D. C." All letters will be promptly forwarded by the editors of the paper to the patentee.



## SANTIZONE.

(Patent and Trade Mark Applied for.)

## The Ideal Disinfectant.

Insures Perfect Sanitary Conditions in Water Closets under all circumstances.

Costs 25 Cents. Lasts 2 Months.

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WASHINGTON, D. C.

(Agents wanted in all cities.)

**FREE!** This beautiful imported ring made of Pure Rolled Gold, with setting of three brilliant stones representing a clover leaf, has the appearance of one worth \$75. On receipt of 10 cts. and slip of paper size of finger, we will send a sample box of our Everlasting Turkish Perfumery and a ring as above described absolutely free and prepaid. This liberal offer is made solely to introduce our goods. Agents coin money selling our perfumery. Address: Potomac Perfumery Co., Washington, D. C.

## "Bubier's Popular Electrician,"

Is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangements whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for \$1.50.

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TO INVENTORS,  
Patentees and Others Interested in Patents.

The subscription to the INVENTIVE AGE and Patent Index has been reduced to 50 cents a year. We know of no other publication that will give inventors and others interested in patents so much special and desirable information for so little money. Our object is to place a reliable, helpful paper in the hands of every inventor and every patentee. The INVENTIVE AGE will publish monthly the number, date and title of every patent issued in the United States, also original and selected matter relating to scientific, mechanical and industrial progress.

Notice: Those who have recently paid \$1 for a year's subscription to the INVENTIVE AGE can either have 50 cents returned to them or, credit for two years' subscription.

Yours,

*C. A. Snow & Co.*

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# *Inventive Age*

## AND PATENT INDEX.

Established 1889.

C. A. SNOW & CO., Editors and Proprietors.,

No. 708 8th Street, Washington, D. C.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada, Mexico, Hawaii, and Porto Rico, for Fifty Cents a year; to any other country, postage prepaid, One Dollar.

Correspondence with inventors, mechanics, patentees, and manufacturers, is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

The INVENTIVE AGE is independent. Special facilities for furnishing cuts of any patented device together with descriptive article. Business specials 15 cents a line each insertion, 7 words to the line. No advertisements less than 25 cents.

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Entered at the Post-office as 2nd class matter.

WASHINGTON, DECEMBER 15, 1898.

LET US clear our heads of the mistake that this world ever did or ever will stand still socially or politically. It moves incessantly and we must move with it. We could not if we would, we would not if we could, isolate ourselves or our country. We are not fashioned for a hermit nation. We have no ground for arrogance or vain-glory. In some things we are excelled by the Spaniards whom we have dispossessed. In manners, so closely related to morals, that the words have the same root, we are inferior to them. But they are on the whole, worse handicapped than we are, for they have as much to forget as we have to learn, and the Islands will have a better future under our somewhat unskilled, clumsy management, than they can have under any country save Great Britain alone. But neither our own country nor Europe will permit us to hand over the Philippines to the country that has proved herself pre-eminent in her beneficent management of alien colonies. So we must take the waif and rear it as best we can.

As for the argument that there is no place in our polity or our constitution for expansion, advanced by Senator Hoar and his school of aged and timid statesmen we may dismiss it as unimportant. There was a time when our constitution and polity were not, and like all human inventions they may survive their usefulness.

"Our little systems have their day  
They have their day and cease to be."

If history and science have any lesson, we read that man was not made for constitutions and politics, but that they were made for man; that he in time outgrows them, or wears them out, just as he does his pantaloons, and, in order that he may not be ridiculous, must have a new pair of constitutions and politics, in which he may more freely exercise his thews and bulk.

We have in time past, extended our borders. The time is opportune for further extension, we must meet it with humble courage, as a privilege, a duty and a destiny.

It was common a short while ago, to denounce the policy of land grabbing and Great Britain came in for much

abuse for this policy. We owe our national existence to one of Great Britain's happy grabs. She had grabbed the bulk of this continent and we like a true chip, have done some grabbing ourselves. But there is beneficence in the British hand that grabs, and alien nations have learned to kiss and bless that hand; while she grabs with one hand, she empties a cornucopia of order, peace and plenty with the other.

And now a word as to the right of every country to self government. There is no such right. Self government is a myth and an unattainable paradox. The strong always have, and always will govern the weak. This is a law of nature. "The tools to him who can use them," and the land to him who can make it most productive. The squaw who tills her little patch of maize with a stick must give way to the man with the sulky plow. We are quite familiar with that gentle philanthropist whose argument is: "how would you like to be a squaw to be chucked out of your picturesque wigwam by a white man with a plow." But this is not a question of individuals. It is a question of forces before which individuals are swept along like seaweed in the gulf stream. The plow is stronger than the stick, the cottage better than the wigwam, and it is through these that the beneficence of conquest is vindicated.

The Indian, the Cuban and the Philippine have no right to the domain which they desolate. In the presence of a stronger, more enlightened force, he has no more right to rule than the wolf has to the prairie, or the tiger to the jungle. The wolf and tiger must give way to the savage with a bow and spear, and the savage must in turn give way to the man with the Krag Jorgensen, broom, and soap.

### Recent Trade-Mark Rulings.

In view of recent rulings of the United States Patent Office in pending applications for Trade-Mark, it is refreshing to read the decision of Judge Baker, the Circuit Court Judge for the District of Indiana, in the case of the Paris Medicine Company vs. Newton C. Davis, a manufacturer of proprietary medicines of Frankfort, Indiana, who was enjoined by the United States Circuit Court from the use by himself, or any of his agents, employees or workmen of the words "Bromo-Quinine," which the Court adjudged and decreed was a *valid trade mark*.

To the same effect may be considered the decision of the U. S. Circuit Court, in the well-known case of the trade-mark "Fibre-Chamois," which is descriptive of the goods—in fact, of the thing itself—yet was likewise held to be a valid trade-mark.

The Patent Office has carried its antagonism toward descriptive trade-marks entirely too far, and, in doing so has imperiled the rights and privileges of manufacturers and others who work entirely under trade-mark protection.

It goes without saying that a purely descriptive trade-mark—one descriptive of the quality of the goods, such as "Good Family Flour," "Choice Brand," etc., should not be exclusively monopolized by anyone,

but when a manufacturer coins a "catchy" phrase, even though it may have the suggestion of descriptiveness about it, he should be protected in the monopoly of that phrase as a trade-mark.

The Patent Office has very recently gone so far as to hold that trade-marks "suggestive of quality" should not be registered; that trade-marks descriptive of the character of the labels, should not be registered, and that trade-marks having the elements of advertising matter ought not to be registered. This is wrong, at variance with the law, and the decisions under the law. The courts have never gone so far, and the Patent Office will doubtless sooner or later adopt a more liberal practice in the consideration of trade-mark applications.

Take, as an instance, the "Blue Label" trade-mark of the Curtice Bros., Manufacturing Co. For many years, their canned goods have been known by their blue label, yet when they came to the Patent Office, and asked for the registration of the words "Blue Label," the Patent Office decided that the words "Blue Label," while not descriptive of the quality of the goods, were descriptive of the label applied to the goods, and therefore not registerable.

According to the same line of reasoning, if a man should adopt a bull's head as a trade-mark for mustard, and apply to the Patent Office for registration of the words "Bull's Head," he would be refused registration on the ground that the words were merely descriptive of the label.

It is true that Patent Office registration determines nothing outside of the Patent Office. The manufacturer can continue to use the trade-mark in commerce, even though the Patent Office should refuse registration; and the courts will protect him in such use under the common law. The value of registration, however, has become so well recognized as a matter of importance to the manufacturer in fixing and determining his rights, that the Patent Office should co-operate with manufacturers, and encourage them to register their trade-marks, in order that the public, as well as the manufacturers, may receive protection against the use of dishonest imitations. Under the present practice which we believe is ephemeral, it must indeed be a unique and extraordinary trade-mark that will succeed in passing the straight and narrow way recently marked out by the Patent Office.

THERE is a fair way to conduct a patent soliciting business and a foul way; a straight-forward, honest way, and a crooked deceptive way. There are many small concerns, and one or two notorious, large ones that are doing a crooked, swindling business. That this is premitted is the more remarkable for the reason that they have been once disbarred by the Patent Office and fraud-listed by the Post Office Department. There is an almost criminal laxity; a laxity that exists to such an extent in no other civilized country in the relation of Post Office Department to notorious frauds.

In the case of John Wedderburn, re-

cently disbarred and fraud-listed, the attention of the Patent Office, and especially of the Post Office Department, was invoked for months before he was disbarred and placed on the fraud-list. It appeared that everybody knew of his dishonesty but the Post Office Department with its corps of special detectives paid to ferret and suppress such rascality.

It is no exaggeration to say that the Post Office Department of the United States is the medium and common carrier of more fraudulent schemes than any other two postal establishments on this planet. In this instance, it appears to have been peculiarly nerveless and back-boneless, for, after placing a notorious offender on the fraud-list, it seems to have melted in pity toward him, and, forgetful that kindness to him is cruelty to thousands of victims yet to be, it has again licensed him. He is now at large with full access, at pound rates, to the mails, with a prize scheme, a newspaper and the almost identical outfit with which he swindled thousands of men and women, and for which he was put on the fraud-list by the Post Office Department barely one year ago.

The times demand that some voice shall cry, "Stop thief!" until it reverberates throughout the land. If the thief has a bludgeon, all the greater the need to cry out and stop him.

The U. S. District attorneys appear to have been negligent of their duty in their leniency toward this person. According to the statement of the Prosecuting Attorney in Washington, he was swamped with complaints and charges against the disbarred and fraud-listed man who has just been rehabilitated by the Post Office Department. The District Attorney said that he had much more evidence than was necessary to convict him. Why then was he not brought to trial?

WE are almost daily asked, by our correspondents, to send them a list of inventions wanted. We always refuse to do so, for while we believe that invention is a perennial condition and a perennial necessity and that every mechanism, process and design is and always will be susceptible of patentable improvement, we have no wish to join the ranks of fakes and charlatans who send lists of patents wanted, the sole object of which is to stimulate inventors to pay them fees. If, however, any inventor lacks inspiration or suggestion, he may be able to find it in the long lists of patents—over sixteen hundred in number—published monthly in the INVENTIVE AGE. He will, in these lists, find what hundreds of inventors believe to be wanted, and *vox populi, etc.*

THE "American Inventor" a paper published in Washington, recently adopted as a titular prefix the name "THE AGE OF INVENTION" which name we protested against, in our October issue, as an infringement of the title of our paper. It gives us pleasure to publish that the managers have discontinued the use of the title "The Age of Invention." This amicable and honorable settlement *extra litem* is creditable both to the intelligence and sense of fairness of the "American Inventor."



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A full printed copy of drawings and specification of any Patent in this list will be sent on receipt of 10 cents in postage stamps. Preserve this list for future reference and always send number of the patent ordered.

C. A. SNOW & Co., Patent Lawyers,

WASHINGTON, D. C.

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#### No Microbes Above 2,000 Feet.

A scientist, looking for microbes, says there are absolutely none on the Swiss mountains at an altitude of 2,000 feet. Here is the place for the purity party; and scaremongers, who are forever horrifying the public with the dismal fear of microbes, would have to take their supply with them, most of which are useful to man.—*Ex.*

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#### Wool From Pine Trees.

Most folks would as soon think of gathering figs off thistles as wool off pine trees, yet that is just what the promoters of a new Oregon industry propose to do. Mr. and Mrs. D. A. Cords are establishing a plant at Grant's Pass for the manufacture of pine needles into a fabric very like woolen cloth. There is nothing new in this industry. It has been carried on in Europe for years, but never before has it occurred to any one that in the forests of Oregon, is better material and more of it for the manufacture of pine wool, than any place else in the world.

Mr. and Mrs. Cords are enthusiasts, but are practical-minded withal, and do not purpose to start in on too large a scale. They intend first to make material of the consistency of excelsior for mattresses; after that they will manufacture the wool which is used for underclothing, bandages and other purposes where a soft and pliable fabric is required. Only the inner fabric of the needles can be used for the latter, and the process is expensive, but not more so than that of the manufacture of lambs' wool.

Mrs. Cords is familiar with the process of manufacturing fabrics from pine needles in Germany and France, and in a visit to Oregon something more than a year ago it occurred to her that the pine trees here were better suited to the purpose of manufacture than those of the continent. A little investigation convinced her that it would be worth while to try the experiment, and, with the assistance of her husband, she started a small factory at Grant's Pass. Machinery of the proper kind was not to be had, and it was necessary to send to Europe for it.—*San Fran. Examiner.*

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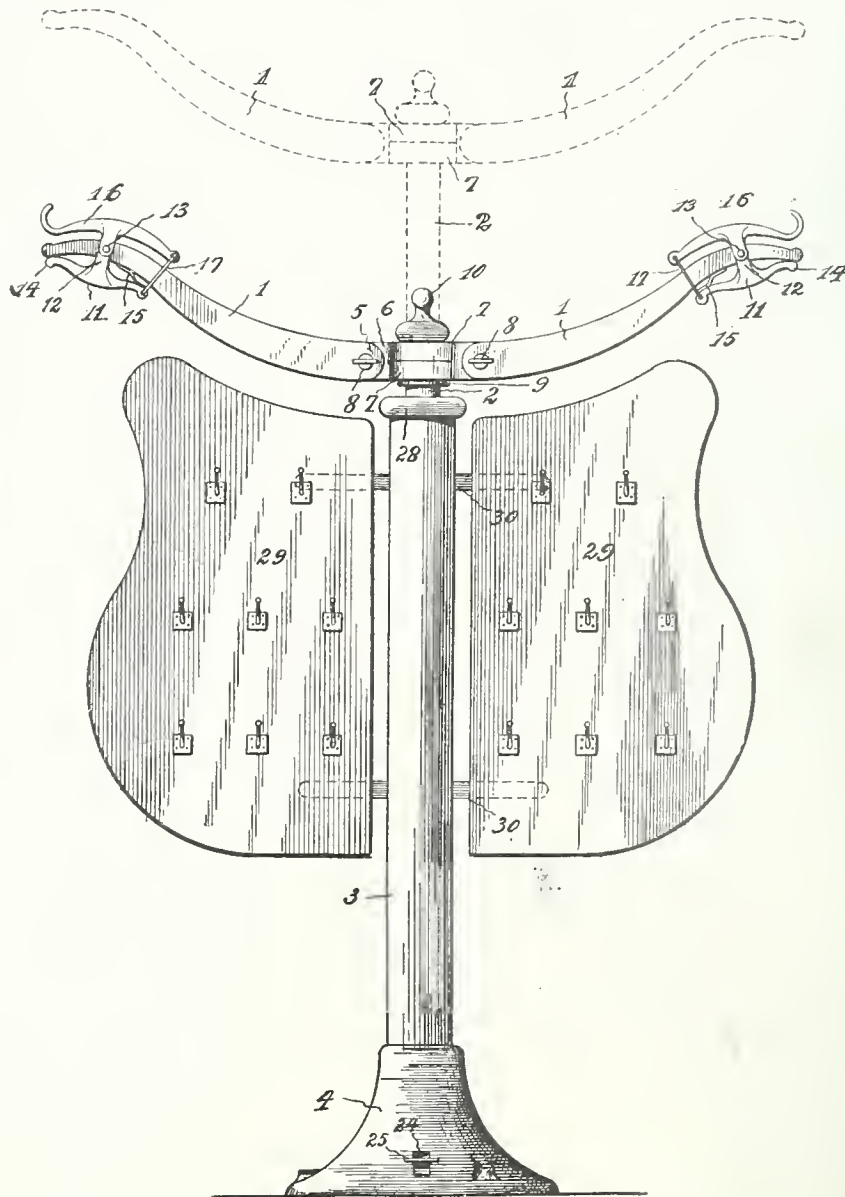
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## COAT HOLDER OR DEVICE FOR ASSISTING IN PUTTING ON OVERCOATS AND LIKE GARMENTS.

This invention relates to coat-holders or devices for assisting in putting on overcoats and like garments, and combines in the structure a convenient hat-rack.

The object of this invention is to provide a device of this character having means for holding the garments in a convenient position for putting the arms into the sleeves thereof, and also means whereby the coat is elevated or lifted to effectually draw the same upon the person without the aid or assistance of another.

To this end the invention consist in a tubular standard 3 encasing a tubular carrier 2, which is provided at its upper end with a pair of swiveled collars 7.



The coat-supporting arms 1 are pivoted to the respective collars 7, as at 8, whereby the arms may be adjusted both vertically and horizontally to suit the size of the wearer. Also by means of the collars the arms may be swung backward out of the way when not in use.

The outer end of each arm is provided with a coat holding clamp, 11, which is provided with opposite ears 12 embracing the arm and pivoted thereto, as at 13. A spring 15 normally holds the outer end 14 of the clamp against the arm. To operate the clamp, a thumb latch 16 is pivoted to the arm and connected to the clamp 11 by means of a link 17. A coat is adapted to be held by its collar, which is placed between the respective clamps 11 and the arms 1.

A spring housed within the stand 3, exerts a tendency to raise the carrier and coat-supporting arms, as indicated in dotted lines. A foot-lever 23 extends through the base of the standard and engages the carrier to hold it normally in its lowest position, as in full lines. By pressing upon the outwardly-projecting portion of the lever, the carrier may be released, and the spring will throw it upward to the dotted position, which action will automatically draw the overcoat upon the wearer in a convenient and effective manner. Extending at opposite sides of the standard 3 are broad flat wooden surfaces 29, connected to the standard by means of brackets 30. Suitable garment hooks are provided upon these surfaces, serving to support hats and coats when not in use.















